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ABSTRACT

This book is the first in a series of Energy Tool Kits designed for women by Consumer Action Now, a non-profit organization devoted to promoting energy efficiency and renewable energy resources. Information is provided in 16 sections: introduction, home energy survey; caulking; weatherstripping (double-hung and sliding windows, and casement, tilting and other-hinged windows); storm windows; insulating window treatments (shades, shutters, curtains and drapes); sun shading options; door treatments (weatherstripping, insulation, forgotten doors such as attics, cellars, garages); insulation (unfinished attics, crawl space walls, garages, unfinished basements); more energy savers (thermostats, hot water heaters, heating/cooling systems, fireplaces and wood stoves, appliances and lighting, clothing and bedding); choosing a contractor; financing home energy improvements; tips on bringing energy consciousness to the community; career opportunities in energy; glossary of key terms; and a bibliography. The book is written in non-technical language and specific instructions, lists of materials, safety considerations, and conservation tips are provided for energy conservation projects. Diagrams of materials, tools, and use of tools, are also provided to make the projects easier to understand and complete. A moveable calculator wheel which shows how much can be saved by taking energy conservation steps is included. (Author/JN)

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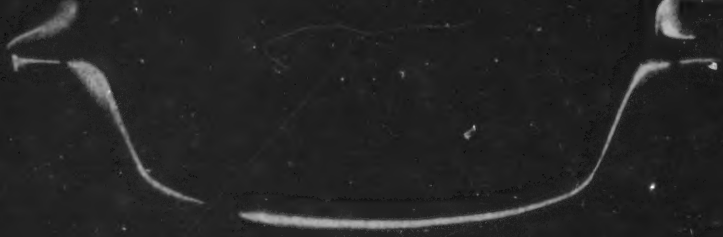

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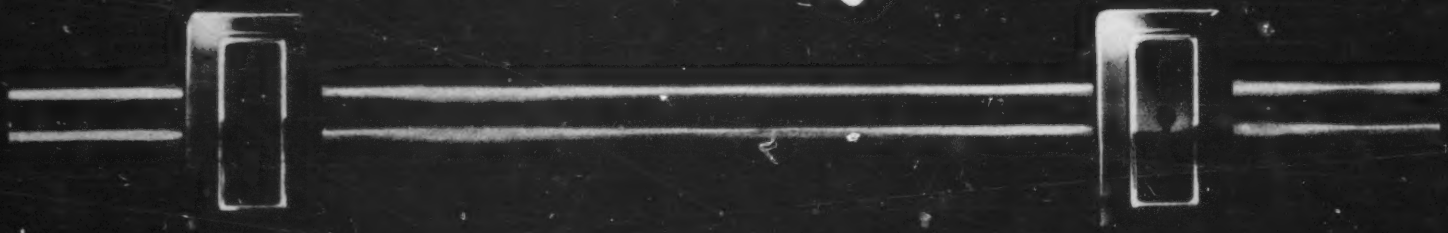

WOMEN'S ENERGY TOOLKIT

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CARPENTER'S SQUARE

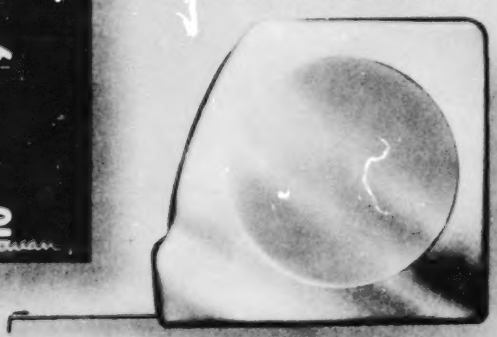
PUTTY KNIFE

SAFETY GOGGLES

AWL

GLOVES

METAL TAPE MEASURE



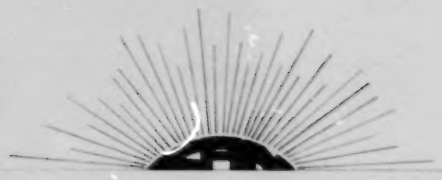
UTILITY KNIFE

WINDOW OPENER
SCISSORS
CLAW HAMMER
CAULKING GUN
SINGLE-EDGE
RAZOR BLADE
GLAZIER'S POINTS
(OR PUSH POINTS)

WOMEN'S ENERGY TOOL KIT

Home Heating, Cooling and Weatherization

Joan Byalin
for
CONSUMER ACTION NOW



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President: Lola Redford
Executive Director: Irmgard Hunt
Project Director: Rita Ellix Katz

oduction credits: Art Director: Len Fink
Writer: Joan Byalin
Educational Consultant: George Tokieda
Research Editor: Elizabeth Tinsley
Technical Consultants: Brent Porter
Doris Iklé

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Page

1. INTRODUCTION by Lola Redford 1
2. HOME ENERGY SURVEY 2
3. CAULKING 4
4. WEATHERSTRIPPING
   - Double-Hung and Sliding Windows 9
   - Casement, Tilting and Other Hinged Windows 11
5. STORM WINDOWS 14
6. INSULATING WINDOW TREATMENTS
   - Shades 18
   - Shutters 23
   - Curtains and Draperies 26
7. SUN SHADING OPTIONS
   - Inside 33
   - Outside 33
   - Landscaping 34
8. DOOR TREATMENTS
   - Weatherstripping 37
   - Insulation 40
   - Forgotten Doors 41
9. INSULATION
   - Unfinished Attics 45
   - Crawl Space Walls 47
   - Garages 48
   - Unfinished Basements 50
10. MORE ENERGY SAVERS
    - Thermostats 52
    - Hot Water Savers 52
    - Heating Systems 53
    - Cooling Systems 54
    - Fireplaces and Wood Stoves 55
    - Appliances and Lighting 55
    - Clothing and Bedding 56
11. CHOOSING A CONTRACTOR 58
12. FINANCING HOME ENERGY IMPROVEMENTS 60
13. BRINGING ENERGY CONSCIOUSNESS TO THE COMMUNITY 64
14. CAREER OPPORTUNITIES IN ENERGY 68
15. GLOSSARY 72
16. BIBLIOGRAPHY 75

Dear Friend,

As conventional energy supplies diminish and fuel costs rise, we are all becoming increasingly concerned about saving energy and saving money. On a national level, energy conservation was singled out in a study by the Harvard Business School as the key to reducing our dependence on foreign oil and to stabilizing the American economy.

Closer to home, growing sales of insulation, storm windows, and other weatherproofing products confirm that many Americans have already discovered that conservation can have a positive effect on the pocketbook. For nowhere does an individual have a greater potential to reduce energy consumption and energy costs than in home heating and cooling.

Unfortunately, the typical American home is an "energy sieve." Up to 40 percent of the energy for which we pay so dearly is *wasted:* it leaks out the windows, goes up the chimney, or drips down the drain.

Fortunately, plugging the leaks and making your house or apartment more energy-efficient is not difficult to do. This book shows you just how easy it can be. What's more, many of the energy conservation steps we describe can be taken at low or moderate cost, and can pay for themselves in fuel savings over a reasonable period of time. And everything you do to save energy will also make your home comfortable.

Why a Tool Kit for Women?

This book is the first in a series of Energy Tool Kits designed for women by Consumer Action Now (C.A.N.), a non-profit organization devoted to promoting energy efficiency and renewable energy resources. We've prepared it because women can play a vital role in conserving energy within the home and in involving their neighbors, co-workers, and communities in the pressing energy issues that challenge our nation.

Women can make a big difference in energy use patterns. Women make 80 percent of all consumer purchases, manage family budgets, and, to a large extent, control energy use in the home. Over 17 million American families are headed by single mothers. Women also make up half of the work force, and because we have traditionally been excluded from higher-paying jobs, many of us are hardest hit by constantly rising fuel costs.

Using the Tool Kit

Since energy problems and solutions vary across the country, we've included a special movable calculator wheel to show you how much you might save by taking the conservation steps in the five main regions of the U.S. The calculator will help you decide the most effective way to use your dollars for conservation.

No matter where you live, you will be interested in our hints on energy-efficient clothing and lifestyles. They'll help keep you and your family comfortable with less reliance on your heating and cooling systems.

In writing the Tool Kit, we have tried to use non-technical language wherever possible. While the idea of handling a caulking gun or a hand saw might put you off at first, women everywhere are learning to use tools skillfully—from a screwdriver to an electric drill. We have taken great care to fill the Tool Kit with projects that are easy, that make a real difference in energy savings and that are useful to either house or apartment dwellers.

Use the Tool Kit. Share it with friends and neighbors. If you are interested in bringing the energy issue to your community, you'll find the special section on community action very helpful. It contains a wide range of practical suggestions for raising energy consciousness using steps as simple as convincing the landlord to lower the thermostat on apartment building washers and dryers to steps as ambitious as organizing an energy fair.

The section on "Financing Home Energy Improvements" tells you how to take advantage of government tax incentives for energy conservation, and it supplies information on state and federal programs available to low-income families.

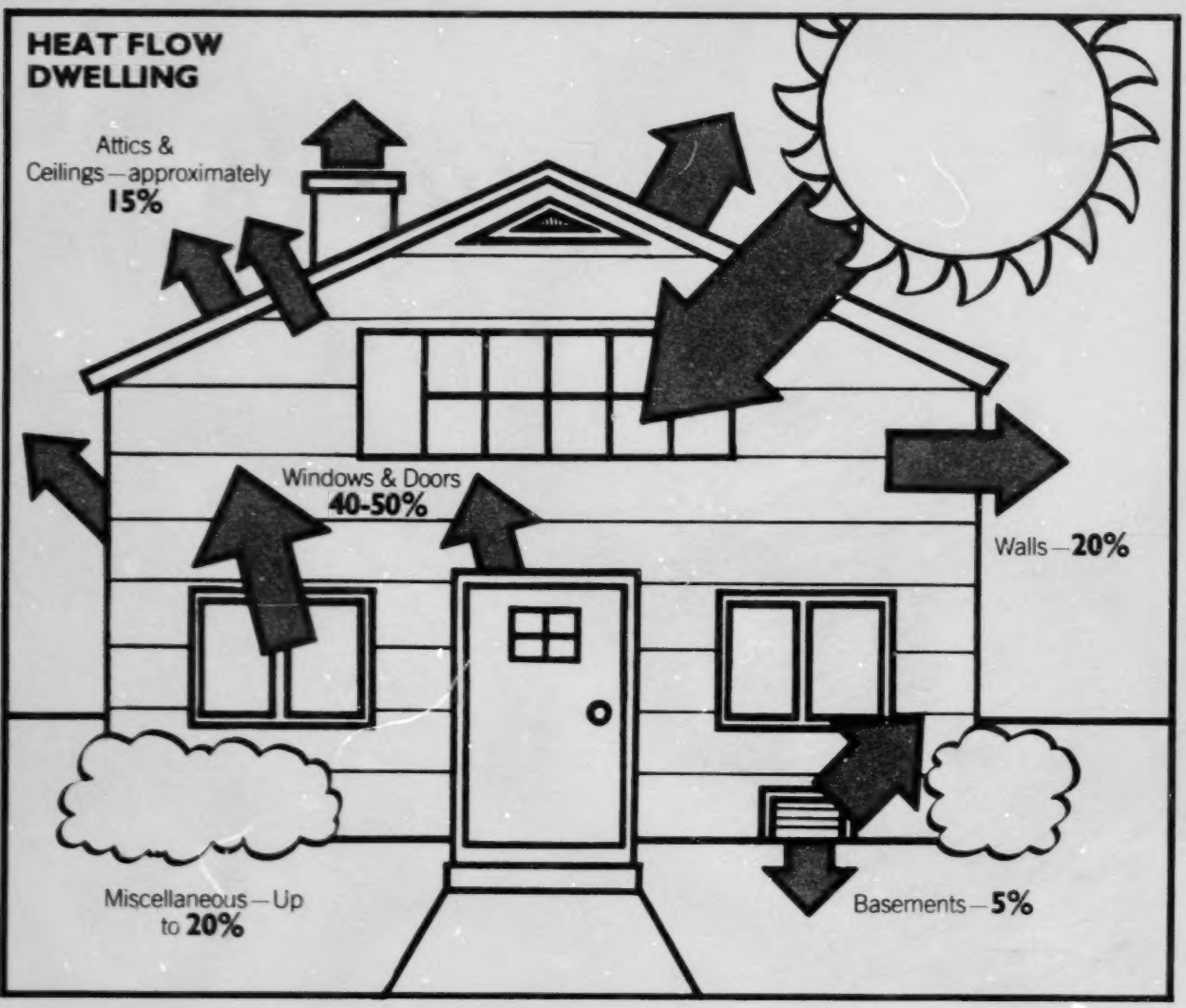
The last section in the Kit may open a new horizon for you. It explains what job and educational opportunities exist for women in the energy field. This new and growing area offers limitless opportunities for women as entrepreneurs, as blue-collar workers, as technologists, as engineers.

We have tried to create in this first Energy Tool Kit a practical, useful guide to making energy conservation work for you. Energy conservation does not have to mean sacrifice. It does mean making a few adjustments in our lifestyles, and using energy more efficiently. For homeowners and renters alike, we've tried to show that *saving energy means saving money.*

Good luck!

Lola Redford

Lola Redford
President, Consumer Action Now



HOME ENERGY SURVEY

This illustration gives a rough idea of the major escape routes for heated and cooled air in the average home. The simple home energy survey that follows will help you to identify your particular problem areas.

Finding energy leaks

Start with your home as a whole. Have you noticed that certain rooms usually feel colder in winter or warmer in summer? Are there any parts of a room in which you always feel warmer or colder than other parts of the room? Are there persistent drafts anywhere in your home? Any discolorations or cracks in your walls, water marks or peeling paint or plaster? A "yes" answer to any of these questions gives you a good idea of where to start looking for energy leaks. To narrow the search down to the specific causes, it helps to understand just how energy leaks happen.

Your home loses or gains heat in two main ways—through *infiltration* and through *conduction*. Infiltration occurs when hot or cold air moves in and out of your home's cracks and openings. The spaces between windows and their frames or doors and their frames are prime targets for infiltration. So is the separation between the foundation and the siding. Wherever it occurs, infiltration can usually be felt as a draft where there shouldn't be one.

Conduction, on the other hand, is the movement of heat *through* walls, windows, and other building materials that separate the inside of your home from the weather outside. Heat always moves from the warm side of a surface to the cooler side. Some materials are better able to resist this heat flow than others. An insulated wall, for example, will permit less heat to pass than an uninsulated wall. Glass, because it has very little resistance to heat flow, is one of a home's biggest causes of conductive heat loss. The resistance of any material to heat flow is called its *R-value*. Windows have a low R-value—R-1; insulated walls are R-16 to R-30, while uninsulated walls are R-3.5 to R-6.

Following the clues

You can check for infiltration by using your hand, a candle, or a simple draft detector you can make yourself from a clothes hanger and a tissue. Check anywhere there is a gap or opening in the walls, roof, or floor of your home. Doors and windows are the chief suspects, but don't overlook the following: fireplace, air conditioners, duct system, pipes or plumbing through walls, and the point where the walls of your home meet the foundation.

Conduction losses can be harder to track down. Basically, you can feel them with your hands. Any point on a window, door, or exterior wall that is warm when you want the room to be cool, or cold when you want the room to be warm, is suspect. Check for conduction losses through any material that has a surface both inside and outside—or between heated and unheated areas of the house—doors; windows; walls; floors above a garage, basement, crawl space, ceilings below an attic.

Another serious conduction problem could be your water heater tank. You're spending money to heat the water, not the surrounding air, so make sure your water tank is fully insulated. Pipes and ducts in your heating system can lose heat by conduction, too!

Once you've identified the places in your home that are costing you energy and dollars, use the simple instructions in the Energy Tool Kit to stop the waste of both.

NOTES:

NOTES:

CAULKING

In all regions, caulking cracks is a good first step to keep heating or air conditioning dollars from "flying out the window."

Caulking compounds are flexible materials that seal joints or cracks around windows and doors or between foundations and walls. Caulking is generally packaged in cylindrical cartridges and is applied using a specially designed caulking gun. Since caulking forms a permanent seal, it should be used only on window and door parts that don't move.

Applying caulking takes some practice, so you'll want to go slowly at first. If possible, select a product that will last so you won't have to re-do the job too soon.

Caulking should be done in the spring or early fall, since most caulking compounds do not flow or adhere in temperatures colder than 45°F. or warmer than 80°F.

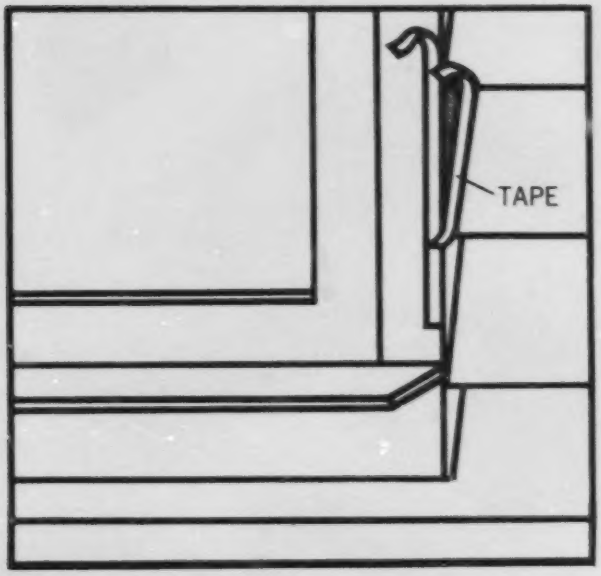
In the event that your walls show signs of extreme moisture, such as stains or watermarks, you should consult a contractor before caulking.

Caulking Sites

1. Wherever window or door frames meet the siding of the house
2. Between window sills and the siding
3. Where the top of the foundation meets the wood frame or the siding
4. Between air conditioners and window frames
5. Around plumbing or pipes that come through the walls of the house
6. Where storm windows meet window frames
7. At corners formed by the siding

Preparing the surface

1. Scrape and clean the surface. Remove dirt, old paint, deteriorated caulking or putty using a putty knife, paint scraper or wire brush.
2. Wipe the area with wet rags. Be certain the surface is *DRY* before you apply caulking.
3. For an easier clean-up, apply masking tape to adjoining surfaces before you caulk. This step is not necessary with water-soluble, latex caulks.



Materials

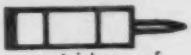
rags

masking tape
(optional)

large nail
(for re-sealing cartridge)

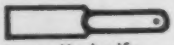
filler of your choice

paint thinner or water

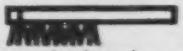

cartridges of
caulking compound

(NOTE: the number of cartridges you'll need will depend on the size of the job you're doing. A cartridge usually contains enough caulking compound to make a ¼" wide bead that is 25 feet long. A good rule of thumb is half a cartridge per window.)

Tools

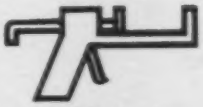

putty knife

scraper or


wire brush

safety goggles

gloves

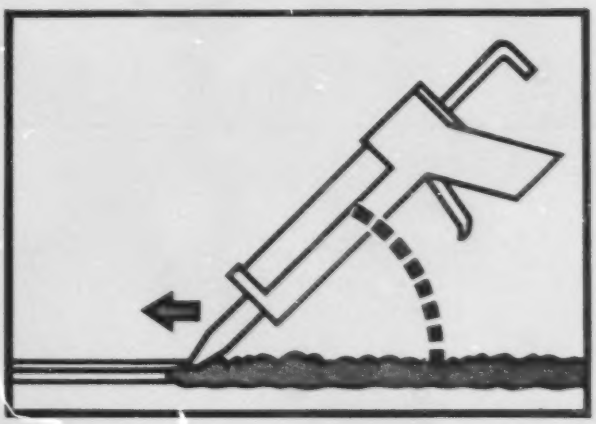

caulking gun

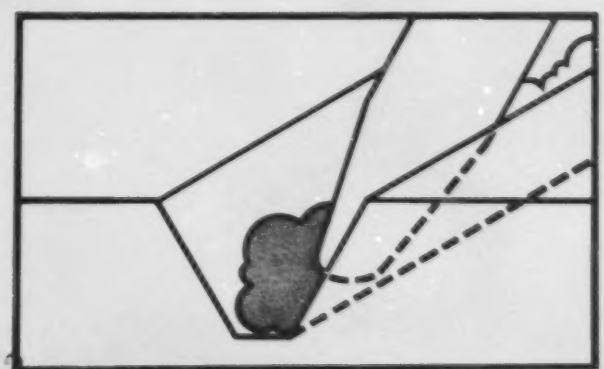
ladder

scissors or utility knife

Applying the caulking

1. Using a razor blade scraper, scissors or utility knife, cut the tip of the cartridge nozzle on an angle to form an opening that is the same width as the crack to be filled (⅛" to ¼").
2. Insert the cartridge into the caulking gun.
3. If the cartridge has an inner seal, push a long thin nail or wire into the nozzle to puncture the seal, enlarging this opening as needed to insure an ample, even flow of caulking compound.
4. Hold the gun at a 45° angle and press the nozzle firmly over the crack. *Push* the gun forward, away from you, releasing the compound behind the tip. On vertical cracks, start at the bottom and push the gun upward. Be sure to apply a slight pressure as you move the gun along, pushing the caulking completely into the crack, and even slightly overlapping the edges.
5. For deeper gaps, push the nozzle down into the crack and fill the gap from the bottom up. Apply as many thin layers of caulking as necessary rather than one thick bead.

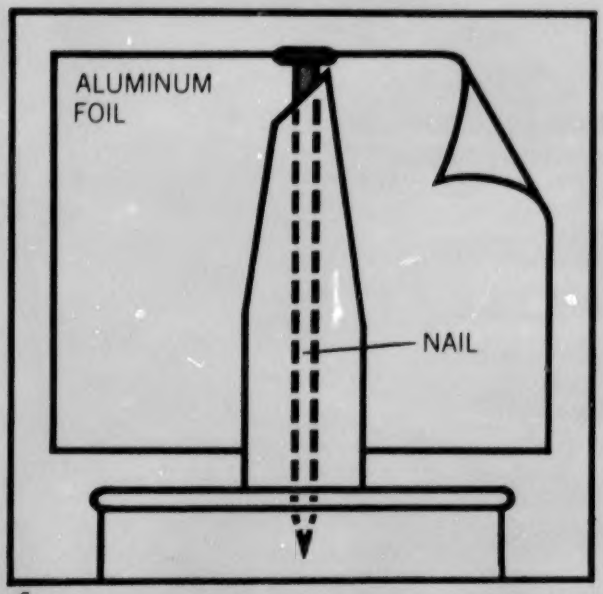




6. Extra-wide cracks (more than ¼") will need a filler. Stuff the crack with oakum or steel wool until you are ½" from the surface, then finish with the caulking gun. Any gap between the top of the foundation and the wood frame should be caulked. If this area is not accessible, caulk the space between the foundation and the siding, making sure to leave a small space or weep hole every foot or two to drain any condensation that may occur behind the siding. If the crack is wider than ½", stuff it with loose fiberglass insulation, which will allow air movement and prevent condensation build-up. DO NOT CAULK OVER THE FIBERGLASS.
7. When you are finished caulking, disengage the plunger of the gun, or else caulking compound will continue to ooze out of the cartridge. Some guns have a release button; others require that you turn the plunger 180°.

Cleaning up

1. If the surface is irregular, you can smooth it by running a wet finger, a butter knife, or any other blunt utensil over the caulking before it hardens.
2. Remove excess caulking immediately with a wet cloth and water (latex compounds only), or the recommended solvent.
3. Remove any masking tape before the caulking sets.
4. You can save the contents of unfinished cartridges. If the cartridge does not have a snap-on cap, re-seal it by inserting a large-headed nail into the nozzle. Wipe away any excess compound and cover the nail and nozzle with aluminum foil. Plan to use the cartridge up in one season.



Painting the caulking

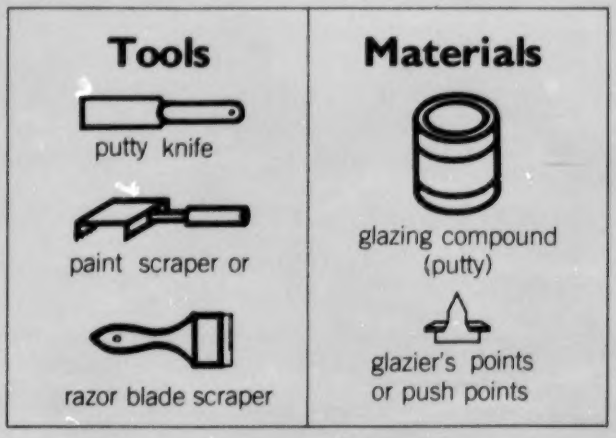
Painting over caulking will make it less noticeable. In the case of oil-based compounds, painting will also improve durability. Be sure to let the caulking set for 24 to 48 hours before you paint, or follow the directions on the cartridge. The caulking should be hard, and not feel tacky to the touch.

*Low-Cost Option

If caulking materials are not available, stuff steel wool, plastic bags, aluminum foil, old rags or newspaper into the cracks.

Tightening Up Loose Window Panes

In many older dwellings, the glass panes themselves may be loose in the window frame, which allows air infiltration and heat or cooling loss. You can apply glazing compound, a putty-like substance, to seal the pane to the frame.

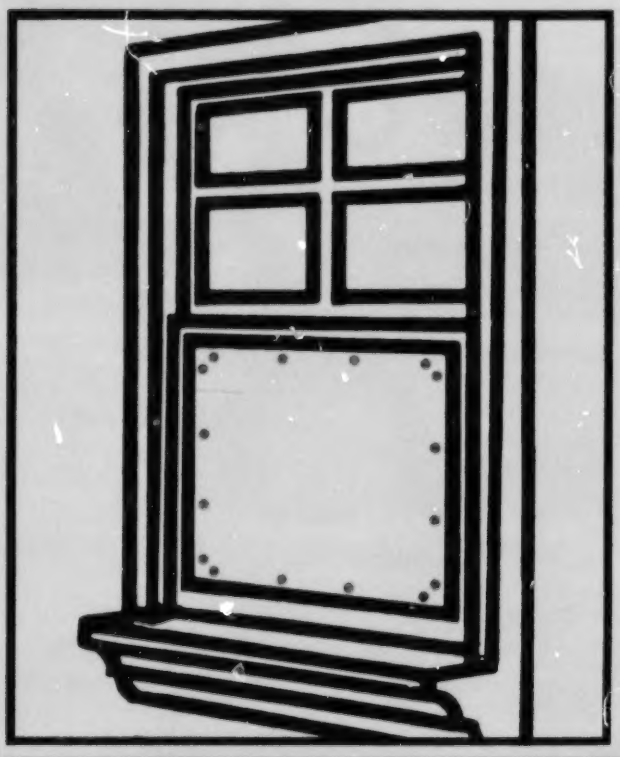


1. Working on the outside of the window, use a putty knife to apply putty to the joint where the pane meets the window frame. Smooth the putty into the crack at approximately a 45° angle, so that it adheres firmly to both surfaces.
2. Scrape any excess putty from the glass or frame with a paint scraper or a razor blade scraper.
3. Clean the window after the putty has set—in 24 to 48 hours.

If the pane is very loose, you will first need to put in glazier's points or push points to hold the glass snugly against the window frame. You may find push points easier to work with.

1. Glazier's points: hold a point against the glass and slide it down until one point of the triangle sticks in the wooden frame. Use a screwdriver to push it firmly into the wood. Tap the screwdriver with a hammer if it is really stubborn.

Push points: slide a point down between the glass and the wooden frame, tapping it gently with a small-headed hammer or putty knife until the notch is level with the frame.



2. Place one point about 2" from each corner and then every 10" or so.
3. Apply the putty over the points.

Safety

1. You may have to use a ladder to reach some of the areas which need to be caulked. In that case:

   Make sure the ladder is secure. Don't try to reach beyond your grasp—rather get down and move the ladder.

   Carry your caulking gun with a sling so that you can use both hands climbing the ladder. You can make a simple sling from an old scarf or rag.

2. If you don't wear glasses, it's a good idea to wear safety goggles while you are preparing the surface. Gloves are good, too—to help you avoid scraped knuckles.

NOTES:

Types of Caulking

Material	Uses	Relative Cost	Durability
Cartridges	Used with caulking gun primarily to fill small to medium cracks		
Oil-based		least expensive	1-2 years
Latex		moderate	5-10 years
Butyl Rubber		moderate	5-10 years
Polysulfide		expensive	more than 20 years (toxic for 3 days after application)
Polyurethane		expensive	20 years
Silicone		most expensive	20 years
Fillers	Used to fill large cracks (more than ¼" wide) and then covered with caulking compound		
Oakum (hemp treated with tar)		inexpensive	indefinitely
Glass fiber		inexpensive	indefinitely
Caulking cotton		inexpensive	indefinitely
Sponge rubber		inexpensive	indefinitely
Rope Caulking	Good for temporary jobs, around storm windows or between air conditioners and window frames	inexpensive	1-2 years
Glazing Compound	Used to seal between window panes and frames	inexpensive	up to 5 years

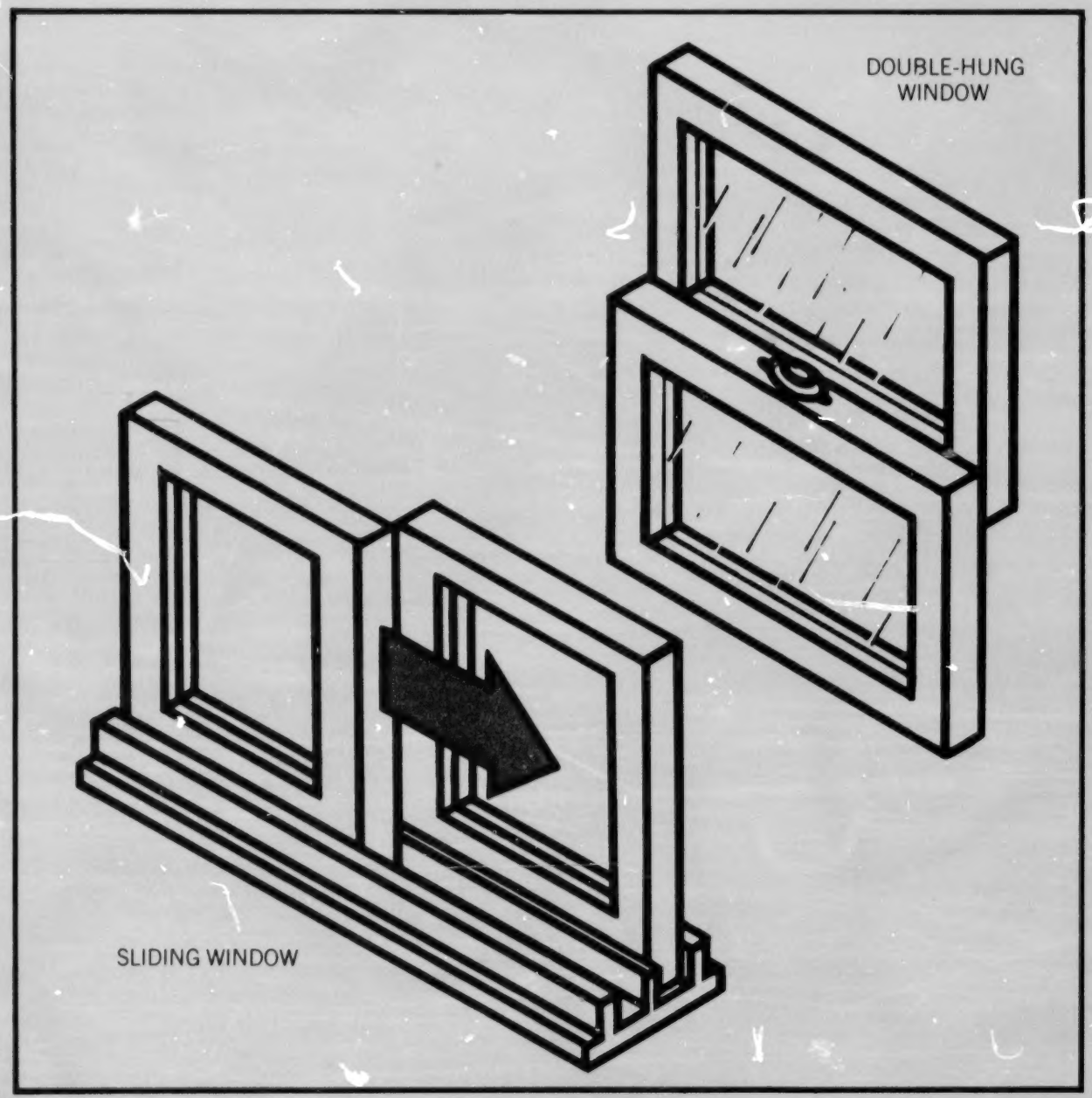
Check the label to determine:
1) the need for a primer coat
2) the recommended method of clean-up
3) the drying time of the caulking compound
4) whether the caulking compound can be painted over.

WEATHER-STRIPPING

No matter where you live, putting weatherstripping around your windows and doors is one of the simplest and most inexpensive ways to realize significant fuel and dollar savings. Weatherstripping—usually narrow strips of vinyl, metal or felt—can reduce air infiltration and drafts in winter and keep cooled air from leaking out in summer. Unlike caulking, weatherstripping is used to seal cracks and joints on window and door parts that move. Installing a lock on a window will make the seal even tighter.

There is a wide variety of weatherstripping products on the market, from the self-stick, adhesive-backed vinyls to the higher-priced spring metal strips and tubular gaskets that need to be nailed into place. In this chapter, you'll find a number of newer plastic alternatives to the more traditional types. They are better choices because they combine low cost with durability and ease of application. All the weatherstripping methods covered here are installed from the inside.

Windows with similar characteristics have been grouped into two categories: (1) double-hung and sliding windows; and (2) casement, tilting and other hinged windows. Regardless of the kind of weatherstripping you eventually choose, make sure it is designed for use on your particular windows. See the Doors chapter for a discussion of weatherstripping doors.



DOUBLE-HUNG AND SLIDING WINDOWS

Note: Directions are given for double-hung windows. Treat a sliding window as a double-hung window turned on its side.

Here are two easy and effective ways to weatherstrip double-hung and sliding windows. With one, you merely insert plastic weatherstripping into the cracks between the window and the frame. This method, though, may result in your windows being difficult to open. You should make sure that at least one window in every room can be easily opened—as an alternate means of escape in case of fire, and for natural ventilation.

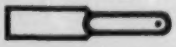
While it is a good idea to keep windows closed during winter, and in summer if you aircondition, residents of temperate regions may prefer the second method described here—a durable and inexpensive plastic weatherstripping that allows you to open the windows easily.

Preparing the surface

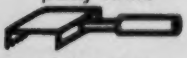
Materials

cleanser

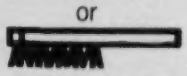
Tools



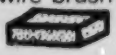
putty knife



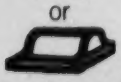
paint scraper
or



wire brush



sponge
or



abrasive pad

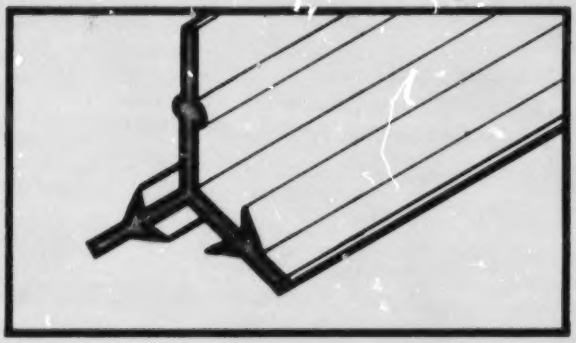
gloves

1. Remove dirt, oily grime and loose paint from the window surface to be weatherstripped. Use a putty knife, paint scraper or wire brush to chip away loose paint.
2. Scour the surface with a good cleanser and a sponge or abrasive pad, and allow it to dry completely before you weatherstrip.

In many older buildings, the windows have been painted over so many times that the cracks between the window and the frame are very irregular. Often the window is difficult to open as a result. In many cases, clearing these cracks for weatherstripping will also make the window work easily once again. Many hardware stores carry a window opener specially designed for this purpose—it is an arrow-shaped, thin metal wedge with a serrated edge and a wooden or aluminum handle. Just run the edge up and down in the crack to loosen the paint. Or use a sharp putty knife. Use paint remover as needed to complete the job.

Triple-Fin Plastic

This ingenious plastic strip has three projecting fins, each of a different thickness. One of them should fit your needs.



Installing the weatherstripping

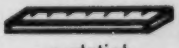
Materials

triple fin plastic
and

"T"-shaped plastic
(for meeting rail)
available in a kit with
enough weather-
stripping for a
3′ × 5′ window.

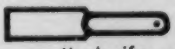
Tools

scissors

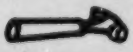


yardstick
or

metal tape measure



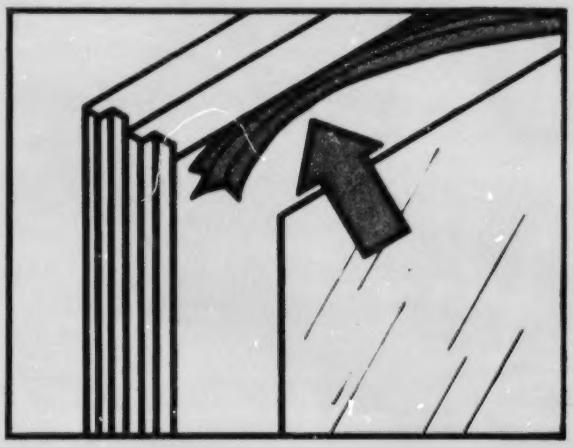
putty knife



hammer

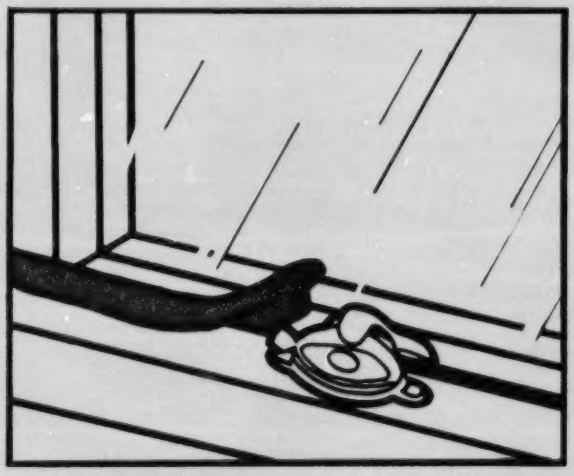
1. Measure the width of the upper window sash and cut one section of triple-fin weatherstripping to this measurement.
2. Try the thinnest fin first. Press it firmly into the crack between the top of the window and the frame. If it does not remain securely in place, remove it and insert a thicker fin.

3. If the fin remains securely in place, continue to weatherstrip the sides of the window in the same way.



Note: On some windows the crack may be too narrow even for the thinnest fin. In this case, hold the thinnest fin over the crack, place the blade of the putty knife against the fin and push the fin into place–tap the knife handle gently with a hammer, if necessary.

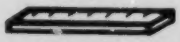
4. Measure the length of the meeting rail (where the upper and lower windows meet). Cut the "T"-shaped strip to this length.
5. Insert the bottom leg of the "T" into the space between the upper and lower windows. (The strip may be cut to allow space for the window lock.)
6. Lock the window to tighten the seal.



"V"-Shaped Plastic

This alternative to traditional spring metal weatherstripping comes packaged in rolls. To form the "V" shape from the flat strip, simply fold the strip in half—leaving the paper-backed adhesive on the outside of the "V". Like spring metal weatherstripping, "V" plastic fits into the channel the window slides in, and does not interfere with opening or closing. Unlike spring metal, it can be installed without nails. One caution: this method works only with windows that open all the way. If your windows stick, try to correct the problem, or choose triple-fin weatherstripping.

Installing the weatherstripping

Tools	Materials
scissors  yardstick or metal tape measure	"V"-shaped weather stripping

1. Measure the height of the lower window sash, plus 2".
2. With the scissors, cut four pieces of weatherstripping to this length.
3. Fold the strip in half, lengthwise, with the adhesive side out, forming a flexible "V" shape.
4. Raise the lower sash.
5. Remove a portion of the protective paper from the strip and press the sticky side to the outer edge of the window channel with the opening of the "V" facing the outside.
6. Slide the topmost 2" of the strip up between the upper sash and the channel. Remove the paper as you work down the channel.
7. Repeat for the three remaining side channels.

To weatherstrip the meeting rail and the top and bottom of the window:

8. Cut three strips the width of the lower sash (channel-to-channel).
9. On the upper sash, press a strip in place on the outer edge of the top rail with the opening of the "V" facing outside.
10. On the lower sash, press a strip on the underside of the bottom rail.
11. On the upper sash, press the last strip along the bottom edge of the inside of the bottom rail with the "V" facing down.

Note: Spring metal weatherstripping is installed in a similar way except that the metal strip is nailed or tacked into place.

*Low-Cost Options

Materials	Tools
newspaper, cloth or plastic clear vinyl strapping tape or masking tape	

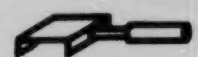
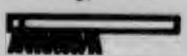
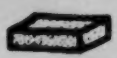
Most of the air flows in and escapes through the cracks at the top, bottom, and meeting rails of your window. To seal these openings:

1. Place folded cloth, plastic or newspaper at the top, bottom and meeting rail of the window.
2. Close and lock the window for a tight seal.
3. If you can still feel a draft, use strapping tape or masking tape to further close these cracks.

CASEMENT, TILTING AND OTHER HINGED WINDOWS

Following are four types of weatherstripping designed for use with casement or other kinds of hinged windows. Three are equipped with self-stick adhesive strips to ease installation: (1) extruded soft plastic sealing bead, which is designed specially for hinged windows and is sold in convenient kits; (2) vinyl-clad foam; and (3) "V"-shaped plastic. The fourth type of weatherstripping described here—"U"-shaped plastic—clamps directly onto the outer edge of the window.

Preparing the surface

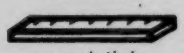
Tools	Materials
 paint scraper or  wire brush  sponge	 spray cleaner

1. Remove dirt, oily grime and loose paint from the window surface to be weatherstripped. Use a putty knife, paint scraper or wire brush to clear away loose or flaking paint.
2. Scour the surface with a good cleanser and a sponge or abrasive pad. Allow it to dry completely before you weatherstrip.

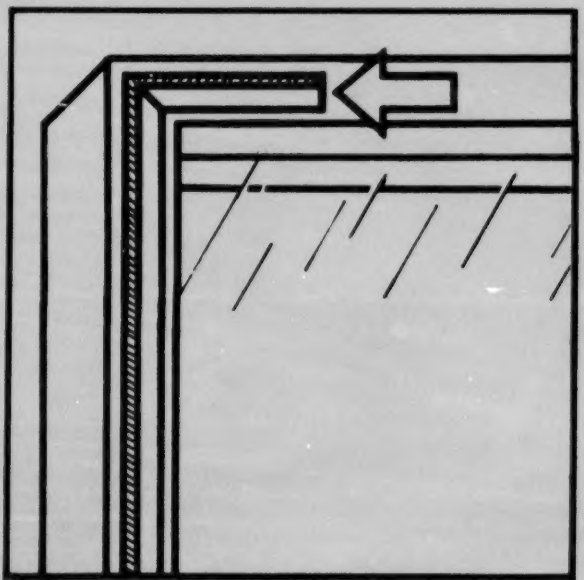
Hinged-Window Seal Kit

You may attach hinged-window weatherstripping to the window sash or to the window frame—whichever is easier to work on.

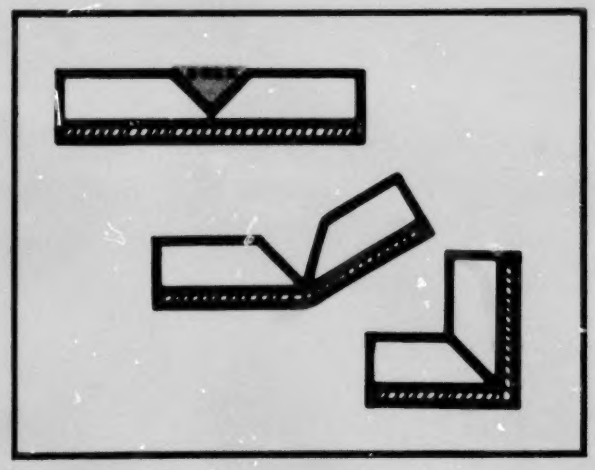
Installing the weatherstripping

Materials	Tools
 hinged-window seal kit (two 9-foot flexible plastic strips)	 scissors  yardstick or metal tape measure

1. Separate the strip lengthwise into two sections.
2. Start in the middle of the window sash or frame, **not at a corner.** Peel the backing paper from the adhesive and attach the strip.



3. To fit the strip at the corners, cut a small "V" from the base of the strip, then bend the strip to form the corner. Attach the strip to the window.

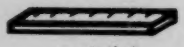
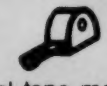
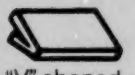


4. Continue to install the strip by pressing the adhesive against the surface until the seal reaches completely around the window.

"V"-Shaped Plastic

This alternative to the traditional spring metal weatherstripping is packaged in rolls of flat strip. To form the "V" shape, fold the thin plastic strip in half.

Installing the weatherstripping

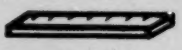
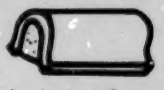
Tools	Materials
scissors  yardstick or  metal tape measure	 "V"-shaped weatherstripping

1. With scissors, cut strips to fit around either the window sash or the window frame—whichever is easier.
2. Fold the strips with the adhesive side out to form the "V" shape.
3. Remove a portion of the protective backing and press the adhesive side of the strip into place, keeping the opening of the "V" toward the outside of the window.
4. Remove the paper as you work your way around the window. The pressure of opening and closing the window will help to make the adhesive bond even more secure.

Vinyl-Clad Foam

This adhesive-backed weatherstripping is more durable than traditional foam rubber strips, which tend to wear easily.

Installing the weatherstripping

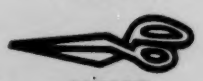
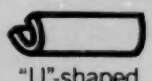
Tools	Materials
scissors  yardstick or metal tape measure	 vinyl-clad foam (available packaged in rolls)

1. With scissors, cut strips to fit around either the window sash or the window frame.
2. Remove a portion of the protective backing, and press the adhesive side of the strip into place. The normal opening and closing of the window will enhance the seal.

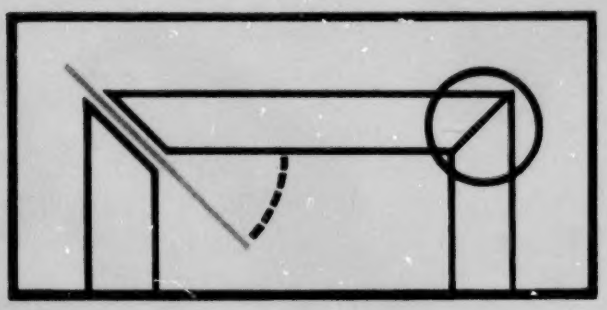
"U"-Shaped Plastic

This clamp-on stripping is one of the easiest to apply. Because the material is clear, it is suitable for use on jalousied windows.

Installing the weatherstripping

Tools	Materials
 scissors yardstick or metal tape measure	 "U"-shaped plastic

1. Measure the strip to fit around the outside edge of the window.
2. With scissors, cut strips of proper length—one for each edge of the window. Cut the ends of each strip at a 45° angle in order to form mitered corners.



3. Slide the strips into place over the edges of the window.

*Low-Cost Option

For casement and other hinged windows, use clear vinyl strapping tape or masking tape to seal openings that admit air.

NOTES:

NOTES:

STORM WINDOWS

All windows, even if caulked and weatherstripped, still lose a great deal of heat through the glass by conduction. The installation of storm windows can reduce this heat loss as well as help block air leaks around the window frames.

One of the best insulators is trapped air. You've probably noticed in cold weather that wearing several thin layers of clothing keeps you warmer than wearing one thick layer—the air trapped between the layers is keeping your body warm. Storm windows work on the same principle—the air trapped between the regular window and the storm window serves as an excellent insulator, reducing heat loss through the window. And because they block heat gain during the air conditioning season, storm windows are a good energy conservation measure in every region of the country.

There are three basic types of storm window: the low-cost plastic type that you can make yourself; medium-priced removable glass or rigid plastic windows; and the more expensive, permanent glass storm windows. All three are about equally effective, but the higher-priced windows are more attractive and more convenient. They also give you the option of opening your windows to allow for natural ventilation.

If you have the opportunity to replace your old windows, or if you are building a new house, you might consider installing the new thermal windows. These are made up of two or three panes of glass with air sandwiched in between and are also known as double-glazed or triple-glazed windows.

Plastic Storm Windows

Carefully made and installed, plastic storm windows can be just as effective as the more expensive glass variety. The cost, durability and appearance of the four types of installation described here will depend partly on the kind of plastic you use:

Flexible Plastic Films

(packaged in rolls)

1. Clear vinyl: durable and transparent, available in several thicknesses. The thicker the plastic, the more expensive it is, but the easier it is to work with.
2. Polyester: improved film now available. It is inexpensive, durable and highly transparent. One new polyester/acrylic film is tough enough for outside use—for inside use, the acrylic layer should face the room.
3. Polyethylene (in 6-mil thickness): inexpensive, not very durable, not as clear as other plastics.

Safety: *Plastic films are flammable. Do not use near an open flame or smoke during installation.*

Rigid Plastic Sheets

Plexiglass and acrylic: costlier and more durable than films, closest in appearance to glass, easily scratched, impractical for very large windows because of a tendency to buckle.

Preparing the Surface

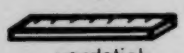
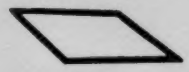
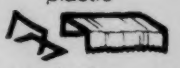
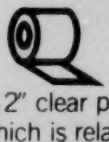
Tools	Materials
paint scraper	spray cleaner
sponge	rags

Remove dirt, grease and loose paint from the window frame and the window sill. Wash and scrape if necessary—the cleaner the surface, the better the tape will hold.

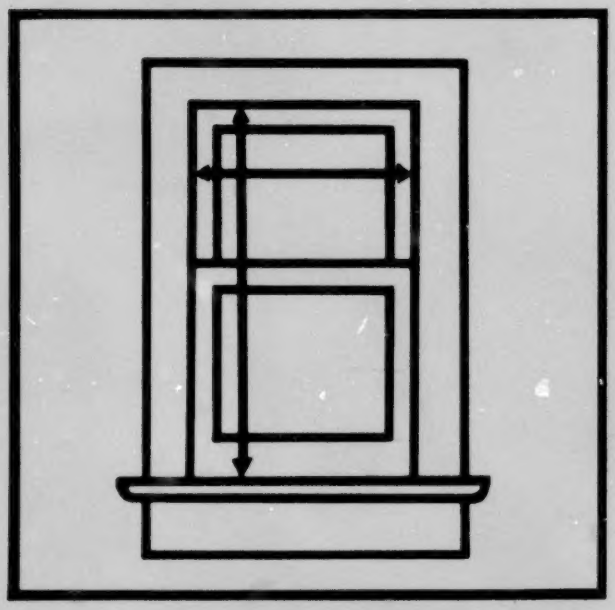
Taping Plastic to the Window Frame

Although plastic films or sheets can be applied to the outside of the window, *we suggest you install them on the inside.* It's a much easier job, especially for apartment dwellers. In addition, it will avoid moisture problems and the possibility of wind damage.

Installing the plastic

Tools	Materials
tape measure or  yardstick scissors staple gun	 plastic  staples  tape – 2" clear plastic tape which is relatively durable, with good appearance, or aluminized duct tape which is very durable but less attractive.

1. Measure the width of your largest window frame and add 4" to determine the width of plastic you should buy. Measure the length of all your windows (allowing 4" per window for borders) to tell how long a roll of film you will need.



2. Cut the plastic to fit the window—allow a 2" border all around. Cut on a lint-free surface, as lint adheres readily to the plastic.
3. Staple the plastic tightly around the window frame. Start with the top of the frame, in the center, and work from the center to the sides. Then stretch the plastic to the sill opposite, and staple it into place—starting again in the center. Staple the remaining two sides—from center out.
4. Tape over the stapled edges of the plastic. Position the tape so that half is on the plastic and half is on the window frame. Use a good quality tape—if it does not adhere firmly, moisture will condense on the window pane.

Tips • *You needn't cover each side with one long piece of tape; it may be easier to apply smaller pieces of tape and overlap them. When covering a large window, it will be easier if someone can work with you.*

• *Small holes left in the window frame by the staples can be easily touched up after you take the plastic down. Fill them with wood putty or plastic wood.*

Stapling Plastic to the Window Frame

With this method, you staple the plastic to the window frame without taping it. By placing cardboard strips between the staples and the film, you can make a tight seal and help prevent damage to the plastic from staple holes.

Installing the plastic

1. Measure window and cut plastic as in Steps 1 and 2 above.
2. Measure around the four sides of the window frame to determine how much cardboard you will need for each window. Cut strips to width and height of window frame.
3. Holding the plastic in place at the top of window, position a cardboard strip over the plastic and staple it carefully into place. Work from the center of the strip out to the ends.
4. Stretch the plastic to the sill opposite and staple it into place. Staple the remaining sides—again, always working from the center outward.

Buying Plastic Storm Window Kits

There are a number of relatively inexpensive kits on the market which provide the material to make sturdy and convenient plastic storm windows. These are designed for either outside or inside installation. Use them on the inside if your window frames are fairly flat and smooth—otherwise, put them on the outside.

One kit contains vinyl film and a grooved, plastic channel to hold it in place. You simply attach the self-sticking channel around the window frame, position the vinyl in the groove, and snap a retaining track into the channel to hold the vinyl in place. The film can be easily removed and stored away when you don't need it. The kit is available in two standard sizes, and the pieces can be cut to fit your needs. Other kits contain only the channel, which you install around the window to hold any flexible film.

Buying or Making a Roll-Up Storm Window

For a novel approach to insulating your windows, you might use clear vinyl shades, which are offered by a number of companies. The shade functions as a storm window because it can be sealed on all sides. At the sides and on the bottom, the shade is held by a track or by magnets; at the top it is enclosed in a box. For those times of the year when you want to open your windows, all you do is roll up the shade. There is no storage problem.

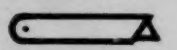
If you wish to make your own plastic storm window/shade, or to adapt an existing shade into an insulating window, see the chapter on Window Insulating Treatments for instructions. One caution: unless you provide a way to seal all four sides of the "shade/window," it won't work as well as the other types described above.

Making Your Own Wood-Frame-and-Plastic Storm Windows

You can make a durable and attractive plastic storm window by building a flat wood frame to hold a plastic film. It's a moderately easy and inexpensive project.

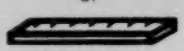
Tools

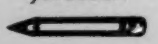
hand saw

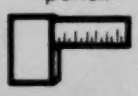

utility knife

staple gun

tape measure
or


yardstick

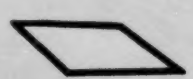

pencil

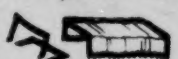

carpenter's square

Materials

1 "x 2" framing (specify #2 pine) or 1 "x 3" for larger windows to prevent warping;

screen molding (If unavailable, use lath or lattice wood);


4-mil plastic film

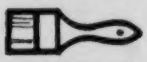

¼" leg staples

white wood glue

Tools

hammer

Optional:


paint brush

sanding block

Materials

self-stick ¾" x ¾" vinyl-clad foam weatherstripping

¾" finishing nails (wire brads)

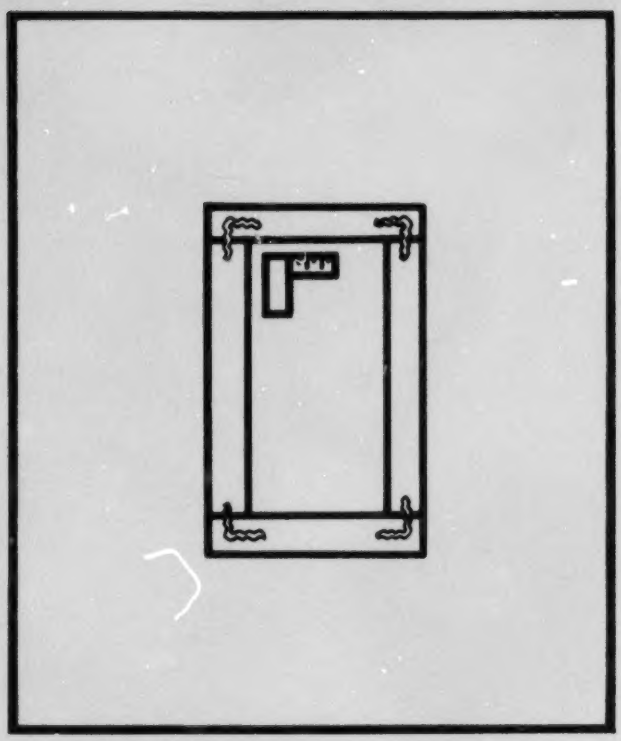
8 cleat or corrugated-type corner fasteners.

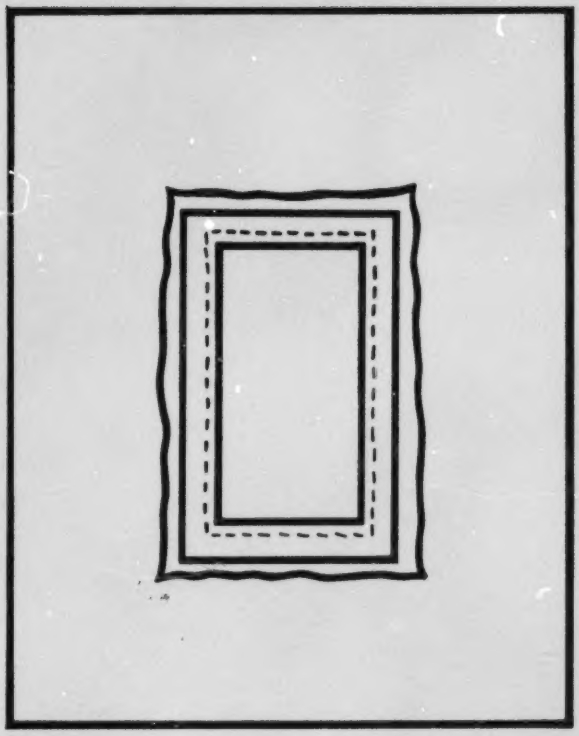
Optional:

paint or stain

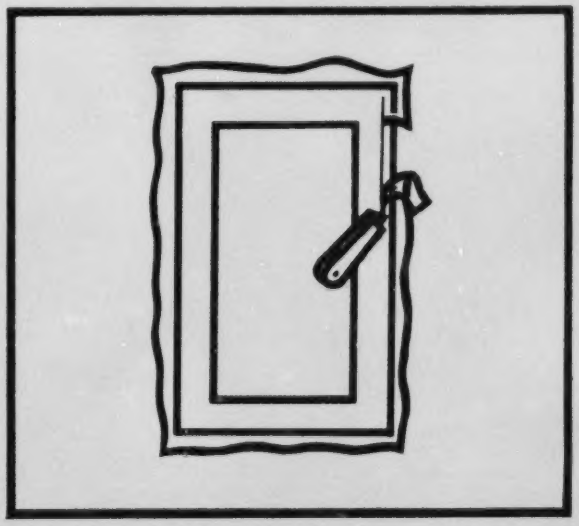
2 small knobs or drawer pulls

1. Measure the opening where your storm window is to be installed. If it is 3' by 4' or smaller, use 1" x 2" wood. If it is larger, use 1" x 3" wood. Buy enough wood, screen molding and plastic—with 2" overlap all around—to frame the opening.
2. Use the handsaw to cut two pieces of frame wood ½" shorter than the width (W) of the opening to allow room for the weatherstripping.
3. Before you cut the framing for the remaining two sides (L) subtract ½" from the height of the opening to allow for the weatherstripping, and subtract the combined widths of the two pieces you have just cut. Measure these widths precisely, since the actual width of a piece of 1" x 2" or 1" x 3" is often less than the stated 2" or 3".
4. Set the pieces on your work surface the way they will finally fit together.
5. Put white wood glue on all surfaces to be joined.
6. Glue the pieces of the frame together to form square corners. Use a carpenter's square on the inside corners of the frame to make sure each corner is truly square. Allow enough time for the glue to dry (follow directions on glue package).





7. Hammer a cleat or corrugated corner fastener into each corner.
8. Saw two pieces of screen molding measuring the length of the frame and two pieces measuring the width of the frame.
9. On the side of the frame without the corner fasteners, draw a diagonal line from the inside corner to the outside corner of the frame at each of the four corners.
10. Draw a line ¼" from the inner edge of the frame, all the way around.
11. Mark the screen molding so you can miter the ends by placing one edge of the molding on the straight line you have drawn around the frame. Then hold the molding in place and mark a line across it at each end, using the diagonal lines you have drawn on the frame as a guide. Mark the remaining molding in the same way.
12. Cut the molding on the diagonal lines.
13. Now hammer the remaining corner fasteners at each corner of the side of the frame you have just used as a mitering guide.
14. If you wish to paint the frame, do so now before you install the plastic. Lightly sand the wood first. Use two coats of paint or one coat of stain.
15. Cut a sheet of plastic film to allow for 2" of overlap on each side of the frame.
16. Staple the plastic to the painted side of the frame. Start stapling in the middle of one side, about ½" from the inner edge, and work toward the ends, pulling the plastic film taut as you go. Start with either short side, then do the opposite side next. Do the remaining sides.
17. To improve the insulating value of your storm window, staple a second sheet of plastic on the other side of the frame.
18. Nail the screen molding to the frame, covering the staples.
19. Trim off the excess plastic with a sharp utility knife. Be careful not to score the wood and ruin your painted finish.



20. Put the self-stick, vinyl-clad weatherstripping along the outside edge of each side of the frame.
21. Install a decorative knob or drawer pull in the middle of two facing sides of the frame for easy removal.
22. Press the finished window into place in your window opening.

INSULATING WINDOW TREATMENTS

In addition to being decorative, SHADES, SHUTTERS and CURTAINS can play an important role in insulating your home against winter chills and summer heat. These devices—especially if they are sealed to the window frame—create an insulating air space that can significantly reduce heat loss through the window.

Such easy, inexpensive steps as adding a reflective backing to your roll-up shade, lining drapes with special fabric, or sealing curtains to the wall with magnetic strips will yield substantial energy and dollar savings. With the investment of a little more time and effort, you can make insulating shutters or an attractive quilted window shade.

As you know, windows are your biggest heat losers; they lose almost five times as much heat as an uninsulated wall! Even with weatherstripping and storm windows, heat still pours through the glass. By opting for any of the insulating window treatments offered in this chapter, you can, in effect, turn your windows into WALLS.

Moreover, because shades, shutters and curtains are "movable" insulators, they allow you the flexibility of adding extra insulation when you need it and removing it when you don't. They can provide extra warmth on winter nights, and be opened or raised during the day to allow sunlight to enter and naturally warm the room. Conversely, on summer days, movable insulators such as shades keep hot air out and reduce your air conditioning load. When it cools down at night, you simply roll up your shades. For a full discussion of Summer Sun Shading Options, see the next chapter.

Used at the right time and in the right place, insulating window treatments are a good bet in all regions. Happily, there is a wide variety of shades, shutters and curtains to choose from—to buy ready-made or make yourself. Your local drapery or window blinds dealer can give you further advice on new energy-saving products and materials.

Note: *In many northern homes, rotting window sills are a common result of moisture condensation. This problem can be further aggravated by movable insulators because they keep the glass even colder, encouraging more condensation. Using the insulator over* storm windows *is one solution to the problem and will also provide better protection against heat loss and gain. Making sure to include a* vapor barrier *and* edge seals *in your shade or shutter will also help prevent moisture build-up. Painting window frames and sills with one of the special low vapor-permeability paints is also useful.*

ANATOMY OF A WINDOW INSULATOR

Not every shade, shutter or curtain can serve as a window insulator. Obviously, a sheer nylon curtain won't be much of a match for January winds. An effective window insulator usually has these features:

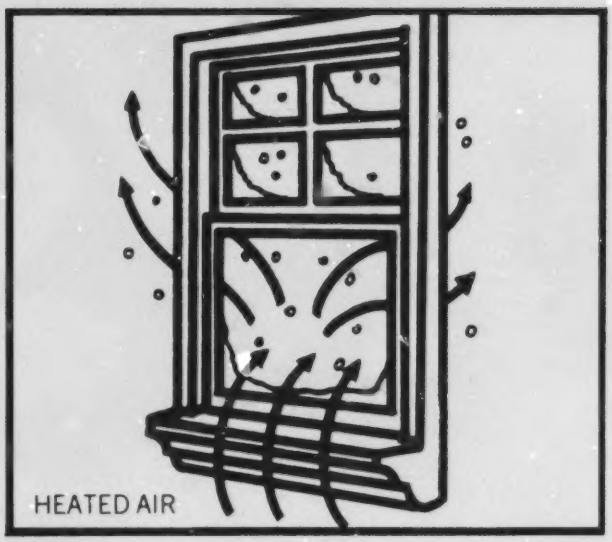
1. **Outer covering** (faces the room): Should be sturdy enough to hold the insulation in place and protect the device from moisture. For a shade or curtain, the outer covering must have some body to it. Firm, tightly woven fabrics such as kettlecloth, duck and most drapery fabrics are preferable to muslins or other loose weaves. Polyester blends wear well and are wrinkle-free. Cottons with a permanent press finish, such as seersucker, plisse or linen upholstery fabrics, are other good choices. Fabrics should be shrink-resistant.
2. **Lining material** (faces outside): Should be light in color, and resistant to sunlight, moisture and shrinkage. For summer use, a white liner will help to reflect back sunlight, as will any aluminized fabric.
3. **Insulating material:** Provides most of the device's resistance to heat flow (R-value). It can be an air space, polyester fiberfill in sheet form, or plastic bubble film.
4. **Vapor barrier:** A must to prevent condensation on windows and in the device itself. It can be flexible plastic film, such as 4-mil polyethylene or lightweight clear vinyl. For shades, vinyl is preferable since it tends to crinkle less when the shade is raised.
5. **Edge seals:** Help achieve the maximum R-value by preventing air flow in and out behind the device. These can be self-stick magnetic strips, Velcro® strips or buttons, or wooden side clamps. (A top seal is important in summer.)

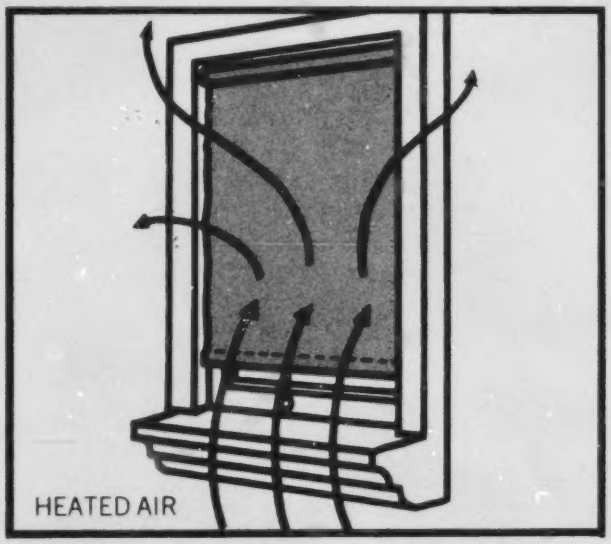
INSULATING SHADES

Shades are one of the most attractive and convenient window insulators available. They can be installed permanently to give you the benefits of "movable" insulation without the storage problems.

Ready-made insulating shades are now available in department and hardware stores. One company offers a kit that allows you to adjust the shade width at home to fit your window perfectly. The shade is made of opaque or translucent vinyl and comes in different thicknesses and colors.

You can also make your own shades or adapt existing shades to give them a higher R-value.





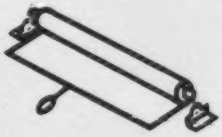
Adapting Your Roll-up Shade

An existing roll-up shade used over a bare window can reduce heat loss by 34% (20% when used over storm windows), *if* the shade fits closely at the sides of the window (¼") and is pulled to within ½" of the sill at night to make an air space between the shade and the window. *Or* you can reverse the roller so that the shade lies flatter against the window.

A shade over a bare window can reduce heat loss by 49% (32% over storms) *if* you seal the edges.

- Install self-stick magnetic strips on the sides and bottom of the shade for a continuous seal.
- Glue Velcro® buttons or strips along the shade and the window at the sides and bottom for a simpler, but less efficient, seal.

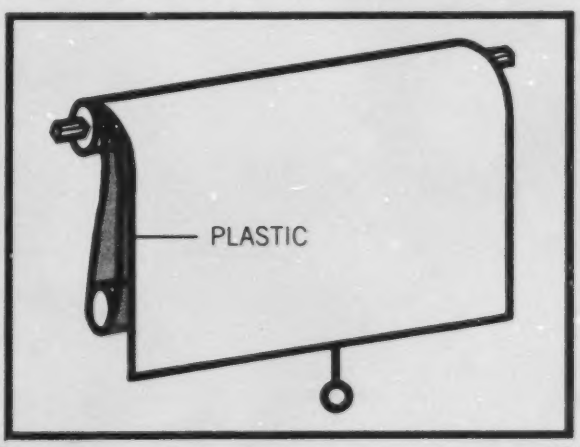
A shade over a bare window can reduce heat loss by over 60%, *if* you add a double layer of aluminized plastic film to the *window side* of the shade.

Tools	Materials
scissors	 roll-up shade
staple gun	aluminized plastic film
hand saw	⅝" wide dowel stick
duct tape	

Installing the plastic

1. Cut a piece of aluminized film the width of your shade and twice the length.
2. Fold the film in half without creasing the bottom.
3. Make sure that the two ends of the film line up together; staple and tape them to the roller behind the original shade.
4. With a hand saw, cut the dowel ¼" shorter than the width of the shade.
5. Slide the dowel into the bottom fold to hold the layers of film apart and help the shade hang straight. DO NOT attach this bottom dowel to the shade. As the shade is raised, the dowel must roll slightly to keep the layers of the shade even and wrinkle-free.

Note: *This design works best when the shade is mounted inside the window opening to keep the dowel from sliding out.*



Making an Insulating Shade

In the following pages, we offer two kinds of insulating shades. The first is a basic roll-up shade, which lends itself to a number of variations. The cost, appearance and effectiveness of the shade will depend on the material you choose. Two of the possibilities — fabric backed with aluminized plastic such as Mylar® and a new "emissive" film — are also described.

The second is a fashionable quilted window shade. Though this shade is more difficult to make, it's worth the effort; doing it yourself can be up to 50% cheaper than buying a comparable ready-made shade.

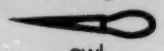
The Basic Roll-up Shade

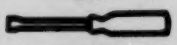
Tools

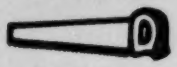
tape measure

scissors

staple gun


awl


screwdriver

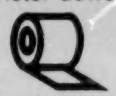

hand saw

Materials

shade material of your choice (some suggestions follow)

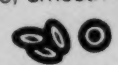
roller (in kit form, with brackets)

¾" diameter dowel stick


clear plastic tape

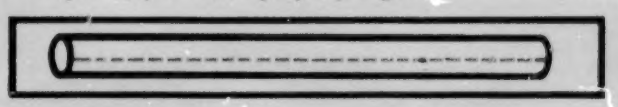
package of small eyelets

ball of heavy twine, smooth finish


plastic pull rings

Constructing the shade

1. Measure the length and width of your window inside the frame. Purchase the shade material in the closest standard width.
2. Using the window width as your guide, buy a roller and the dowel stick. (Rollers come in standard widths. If needed, a hardware or shade store can cut the roller to fit your window.)
3. Cut the shade material to the length of your window plus 4".
4. Trim the material to fit the roller.
5. Roll the material halfway around the roller, making sure to line up the edges of the material with the horizontal guide. (Most rollers come with a guide. If not, you'll have to pencil a horizontal mark on either side. The shade won't roll up evenly if it isn't properly aligned.)



6. Staple and tape the material in place.
7. With a hand saw, cut the dowel stick to the width of the shade.
8. Wrap the bottom of the shade around the dowel stick with the raw edge facing the window.
9. Tape and staple the dowel into place.
10. Optional: Tape the edges of the shade with clear plastic tape to help prevent wear.
11. Using the awl to make a hole, insert a small eyelet into the dowel, and attach a cord and a ring for the pull.
12. Install the brackets and insert the shade.

Variations on the Basic Roll-up Shade

Use two layers of material instead of one — a white or decorative fabric for the room side of the shade and an aluminized plastic film, such as Mylar®, as a liner. The fabric and the film need not be bonded to each other. Just cut the two layers the same size and attach them to the roller together. (See Step 3, Basic Shade constructon.)

Use a special "low-emissive" film. Tests have shown that a single-layer shade made from this material can match the performance of a storm window in reducing heat loss. The film, which has the darkening effect of sunglasses, allows about 25% sunlight through, and at the same time reflects heat back into the room. Emissive film can be placed directly on the window glass; however, in most regions, permanent application has the disadvantage of depriving the dwelling of valuable solar gain during the winter. This problem can be solved by using the film in a "movable" shade. For maximum cost-effectiveness, emissive film shades can be used on all windows in northern climates, but only on south windows in southern regions.

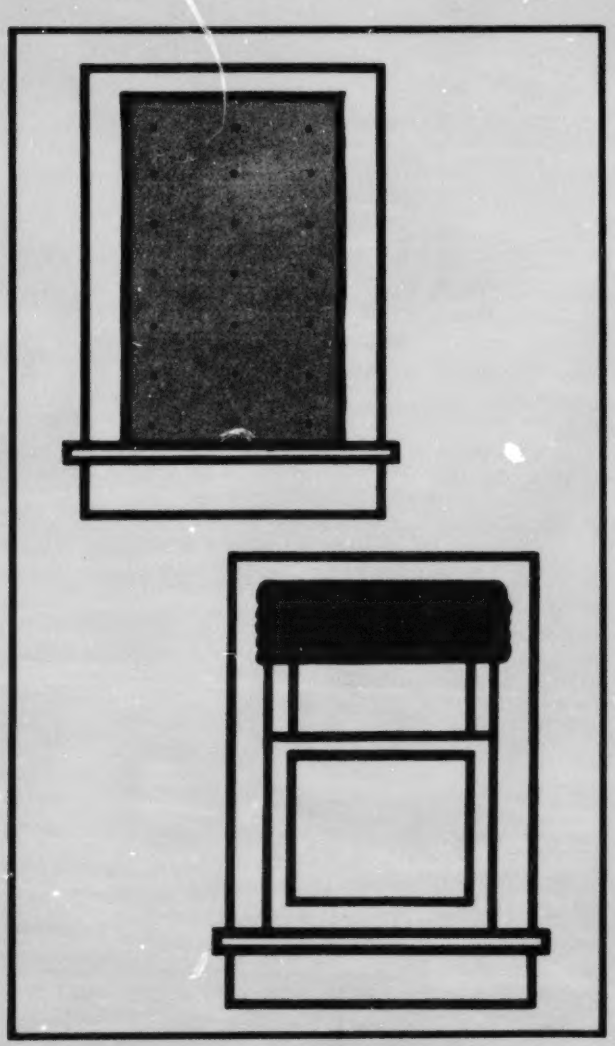
One company manufactures an innovative shade/roller with a snap-in flexible plastic spine that allows you to change shade materials with a minimum of fuss. You just snap out your reflective film shades after the summer and replace them with insulating shades when the weather cools.

A Quilted Window Shade

This moderately easy-to-sew Roman shade is based on a design by the Center for Community Technology in Madison, Wisconsin.* The shade, which hangs inside the window opening, is made of four layers of material held together by a seam around the edges and quilting ties arranged in rows. Because the shade is wider and longer than the window opening, the sides fold against the window frame when it's closed, trapping a layer of air. The bottom seal is made by attaching Velcro® to the shade corners and the window frame.

The shade is installed with a wooden mounting strip that is screwed into the top of the window opening. Before undertaking this project, make sure that you have a fairly flat surface at least ¾" deep at the top of your window opening so you can attach the mounting strip.

To raise the shade, you simply pull on a set of nylon cords that are attached to the back of the shade with plastic rings and to the mounting strip with screw eyes. The shade folds up like an accordion at the top of the window.



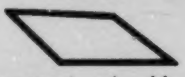
*Detailed plans are now available for an easy-to-install insulating shade that features tight side seals for more effective protection.

"Window Warmer" $3.00
Center for Community Technology
1121 University Avenue
Madison, WI 53715

Constructing the shade

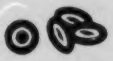
Materials

outer and lining fabrics (see Anatomy of a Window Insulator)



vapor barrier (4 mil polyethylene or light-weight clear vinyl)

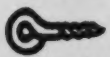
polyester fiberfill (use 2 layers if less than ½" thick)



½"plastic rings

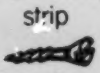
button or carpet thread

nylon twine (twisted, 210-lb test)

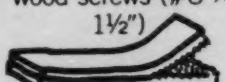


3 or 4 ½"-diameter screw eyes

1" × 2" wood for mounting strip



2 or 3 flat wood screws (#8 × 1½")



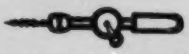
3" strip Velcro®

Tools

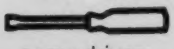
sewing machine (shade may also be sewn by hand);

metal tape measure

tailor's chalk or marking pen

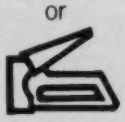


For installation: drill (⅛" and countersink drill bits)



screwdriver

thumbtacks or

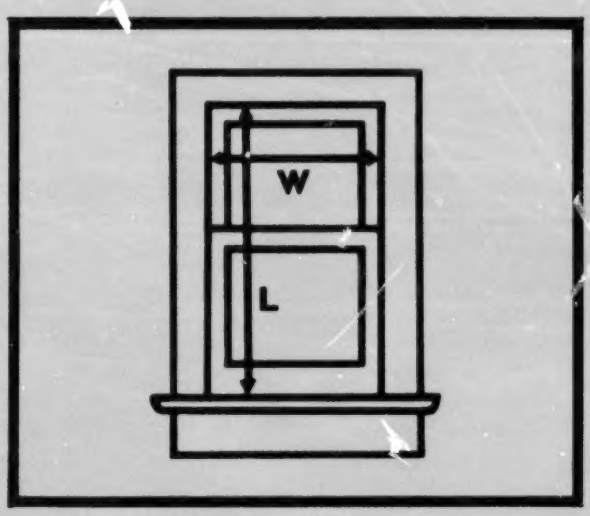


staplegun (¼" staples)

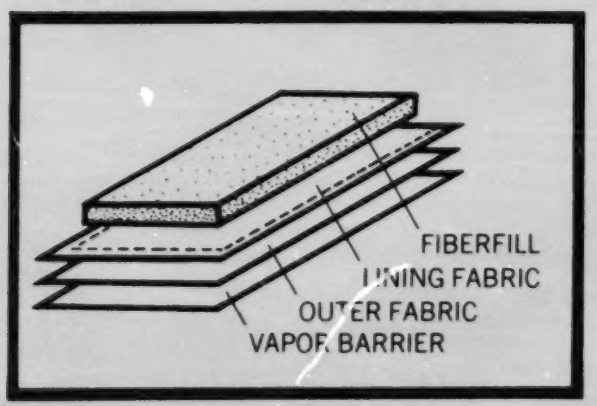
Materials

glue or double-stick picture mounts

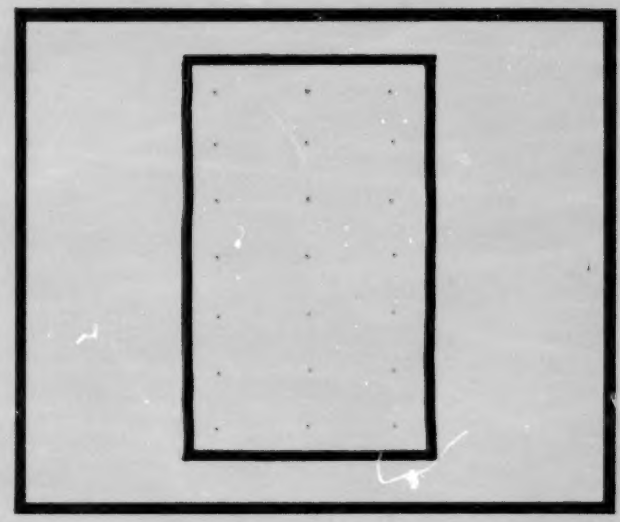
1. To find the basic measurements, measure the width (W) of the window opening. Measure the length (L) of the window from the top of the opening to the sill.



2. Cutting the material: For the *outer fabric* and *lining fabric*, add 6" to the basic width measurement and 5" to the basic length to allow for seams and overlap. For the fiberfill, add 2" to the width and 2" to the length. Cut the vapor barrier 6" wider and 4" longer than the basic measurements.
3. Baste the fiberfill to the wrong side of the lining fabric by hand. The fiberfill should be 1" up from the bottom and centered from side to side.
4. Pin the vapor barrier to the wrong side of the outer fabric, being careful to pin only in the seam allowance. The plastic should be flush with the fabric at the bottom and sides and 1" shorter at the top.
5. With the fabric sides together, sew the outer fabric to the lining on the bottom and sides by hand or machine. Use a ½" seam and a medium-long machine stitch so the plastic won't tear. (The fiberfill should not be in the seam.) If you use a machine, sew with the plastic underneath so it won't stick to the presser foot.



6. Remove the pins and turn the shade inside out, making sure to push the corners out. Turn the top edges in and stitch a ½" seam by hand.
7. Quilting: The quilting ties keep the layers together and hold the plastic rings for the shade cords. An average window shade will have 3 or 4 vertical rows of ties and 5 to 7 horizontal rows. The ties can be spaced from 8" to 12" apart. Make the bottom ties at least 4" from the bottom edge and space the others evenly from there to the top. The side ties should be approximately 5"-6" from the edge of the shade. (If you increase the number of horizontal rows, the shade won't protrude as far into the room, but it also won't pull up as high when opened. If you increase the number of vertical rows, the folds will sag less when the shade is drawn up, but the shade will be slightly harder to pull up.)
8. With tailor's chalk, a felt-tipped pen, or pins, mark the spacing of your quilting ties. (If you want the ties to show, work from the room side of the shade; if not, work from the lining side.)



9. Push your needle down through all the layers of the shade. Attach a plastic ring to the lining side of the shade by stringing the needle through the ring, then coming back up through the material about ¼" from the first stitch.
10. Tie the strings loosely together and trim them to about ½" in length. (Don't tie the strings too tightly. If you crush the fiberfill too much, it will lose its R-value.)
11. Stringing the shade: Cut as many nylon cords as you have vertical rows of quilting ties. The length of the longest cord will be equal to twice the height of the window opening plus the width (**2L + W**). The length of the shortest cord will be twice the height of the window opening (**2L**). The middle cord will be equal to twice the height of the window opening plus half the width (**2L + ½W**).

12. To keep the cords from unraveling, sear the ends by holding them in a match or candle flame until they melt. Avoid breathing the fumes.

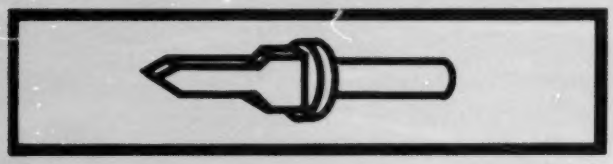
13. Tie a cord to the bottom ring in each row and thread it up vertically through the remaining rings in the row. If you wish to pull up your finished shade from the left side, string the longest cord on the right side, and vice-versa.

14. Cut a wooden mounting strip 1½" shorter than the width of the window opening.

15. Center the mounting strip at the top of the shade and mark the placement of the screw eyes by matching with the rings in the top row.

16. Also mark a hole about 6"-8" from each end of the mounting strip for the two screws that will attach the strip to the window frame. (Windows over 30" wide will require more screws.)

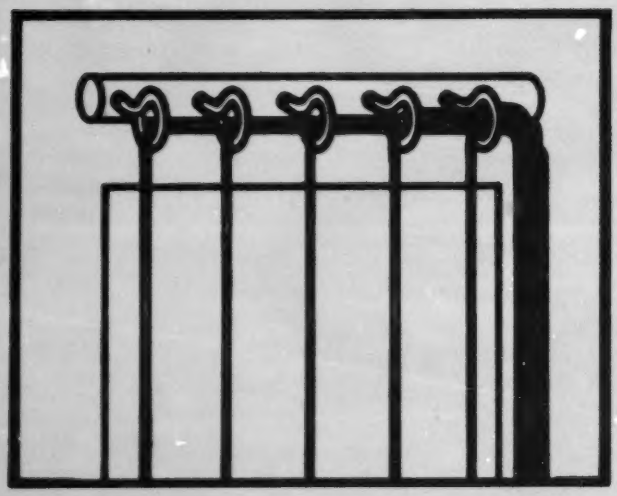
17. Drill the holes big enough so that the screws will just slip through the mounting strip. You will now have to countersink these holes so that the heads of the screws will be slightly below the surface of the wood. To do this, drill each hole with a special countersink drill bit.



18. Hold the mounting strip against the inside top of the window opening. Mark and drill two ⅛" starter holes in the window frame.

19. Drill ⅛" starter holes in the mounting strip where the screw eyes will go. Put the screw eyes in.

20. The cords can now be strung through the screw eyes and joined at one side of the shade as shown in the illustration. Once the shade is installed the nylon cords can be tied, looped or braided together.



21. Use thumbtacks or ¼" staples to attach the shade to the mounting strip. Lay the shade with the lining side up and center the mounting strip just below the top of the shade. Fold the shade over the top and ends of the mounting strip and tack in place. You may have to experiment to get the shade to lie smoothly.

22. Place the whole unit inside the window opening and screw the mounting strip into place.

23. Cut two 1½" strips of Velcro®. Attach the stiff half of the strip ½" up from the bottom of the window frame with double-stick picture mounts or glue. Hand sew the soft fuzzy half to the quilt at the appropriate spot to match the strip on the frame.

Operating the shade

When closing the shade, fold the edges and bottom of the shade back toward the window. Pull the shade downward until it is taut, then press the Velcro® tabs at the corners.

A number of methods can be used to secure the cords so the shade will stay up when it's opened: 1) loop the cords at the bottom so they can be slipped over a peg or hook that is screwed into the window frame; 2) attach a cleat to the frame and tie off the cord when the curtain is partly or fully opened.

Cleaning the shade

Hand wash the shade in warm water with a mild soap or detergent. Soak for 20 to 30 minutes, then press out the water by hand. Do not wring. Air dry or tumble dry at a low temperature. Dry cleaning is not recommended.

INSULATING SHUTTERS

Shutters can be the simplest and most effective way of having movable insulation at a reasonable cost. From the many shutter designs available, we have selected two relatively easy do-it-yourself projects: a pop-in shutter, which must be removed daily; and a more traditional hinged shutter that is permanently installed.

The pop-in shutter is simplicity itself. You merely cut the shutter material to fit your window and wedge it into place. The pop-in can be made from pressed cardboard, or even an old carton, and decorated with the covering of your choice.

The hinged shutter is equally effective, more convenient, and somewhat harder to make and install. It takes up more room space when opened, but eliminates storage problems as well as the time and effort needed to put in and take out the "pop-ins."

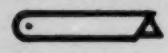
A Thermoply® Pop-in Shutter

This relatively easy-to-make pop-in is made from Thermoply®, a high-density cardboard covered with foil.* The shutter consists of two sheets of Thermoply® which are held apart by a wood frame to create an insulating air space. After the cardboard is glued onto the wood, the panel can be decorated.

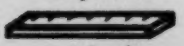
Constructing the shutter

Tools

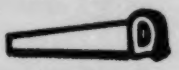
tape measure or yardstick



utility knife



metal ruler



hand saw

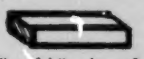
staple gun

fine black marking pen

Materials

Thermoply® panels ⅛" thick, available in 4' x 8' sheets. For economy, the scraps can be glued or taped together for another shutter.)

*If Thermoply® is not available from your local home improvement center, check with building supply distributors in your area.

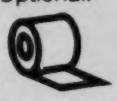


¾" x 1½" pine for frames

construction adhesive

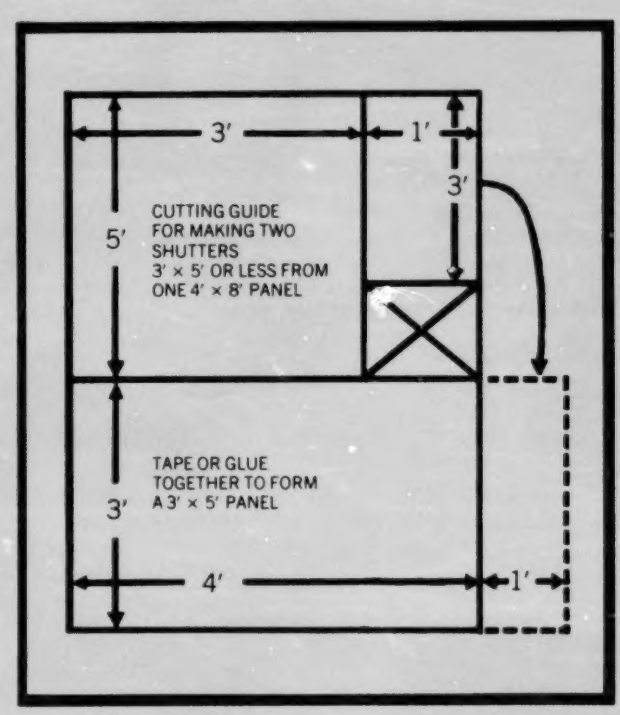
vinyl-clad foam or "V"-type weatherstripping

Optional:

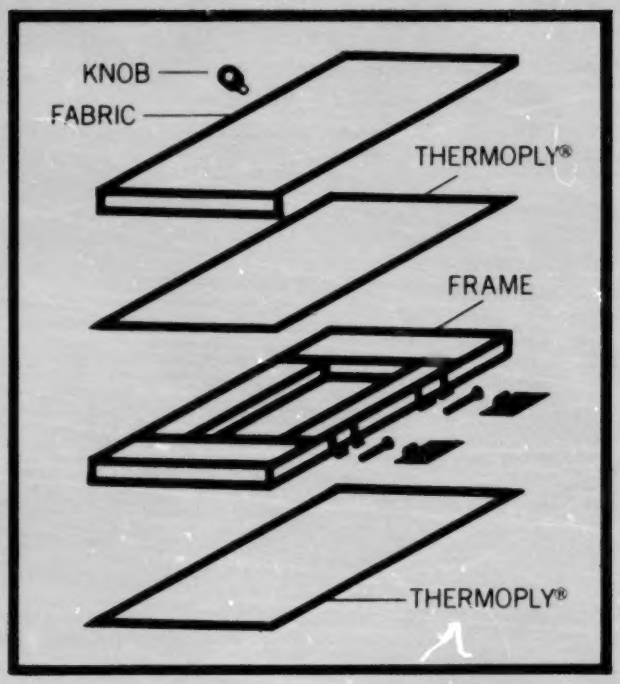


aluminum duct tape

1. Measure the height and width from inside to inside of the window trim. To figure out how much Thermoply® you will need, multiply the length times the width and then multiply by two. For the frame wood, buy an amount equal to two lengths and two widths.
2. Before transferring the measurements of your window opening to the Thermoply® sheet, subtract ¼" on all sides to allow for weatherstripping. (Optional: Allow ½" for flat cove molding—see Decorating Options.) Now, using a fine black marking pen and a metal ruler, draw your pattern on the Thermoply®. To simplify cutting, your pattern should be square, even if your window opening is slightly out of square.
3. Tape a metal ruler along one line and carefully cut with a sharp utility knife. Although the cardboard is only ⅛" thick, you will probably have to go over each cut more than once.
4. Move the ruler to the next line and finish cutting out the panel. Then, using this panel as your pattern, trace and cut out a second panel. *Or* if your window measures 3' x 5' or less, use this cutting guide to make a second panel from leftover pieces. Tape the pieces together with aluminum duct tape.



5. Using one of the panels as your guide, cut 4 pieces of frame wood to form a rectangle the same dimensions as the panel.
6. Place one of the panels on a flat surface. Lay the 4 pine strips along the outer edge of the panel to form the frame. Make sure that none of the pieces extends beyond the edge. Now apply adhesive to each piece of pine and glue it in place. Allow to dry.
7. Turn the panel and frame over and staple along the frame for a stronger bond.
8. Turn the panel so the wood is facing up once again. Apply glue all the way around the frame. Press the second panel firmly in place. Allow to dry. Staple.
9. If you wish to decorate the shutter, do it now. See the Decorating Options which follow.
10. Install the weatherstripping around the outer edge of the shutter.



11. Attach a small knob midway on each side of the shutter for easy removal.

At this point, the shutter is complete. You just pop it in place at sundown, and start increasing your comfort. Remove the shutter in the morning to get the benefits of *free* energy from the sun.

Decorating Options:

If you wish, you can paint or cover the room side of the shutter with paper, fabric, wood or wood paneling, cork, or any other facing of your choice. Wood veneers can also be glued on.

You should leave the window side of the shutter free of decoration so that it will reflect sunlight in the summer.

Wood trim can be glued around the front edges of the panel for added strength and protection. This light-weight wood frame is especially good for panels made by taping scraps together. Flat cove molding (the width of the panel) can be used to protect the edges and provide a solid base for the weatherstripping.

A Pop-in Shutter Made from Cartons

Pop-in shutters can be made at almost no cost by gluing sheets of corrugated cardboard together with white glue to a thickness of ½". The edges of the cardboard should be taped with masking or duct tape for strength, wear-resistance and waterproofing. You can also tape plastic or aluminum foil on the window or the room side of the shutter to waterproof it against any condensation on the glass.

The room side can be painted or covered with fabric or paper.

Large refrigerator boxes are an excellent source of double-thickness cardboard and provide large enough sheets to make a window-size panel. Furniture stores are another good source of large cardboard cartons.

A Hinged Shutter

The following plan is based on an insulating shutter designed by the Homesworth Corp. of Yarmouth, Maine.* The shutter consists of two panels which are hinged to the inside of the window frame. Each panel is made of two sheets of high-density Thermoply® cardboard separated by four strips of wood. This inner frame creates an insulating air space between the cardboard sheets, which is one reason for the shutter's high R-value (R-6).

*Complete shutter kits are available in 3 sizes: 48" x 32"; 56" x 36"; 62" x 36". For additional information contact:

Homesworth Corp.
18 Main Street
Yarmouth, ME 04096

Constructing the shutters

Materials

Thermoply® panels (⅛" thick, 4' x 8';

¾" x ½" pine for frames and for sill stop

construction adhesive

"V"-type weatherstripping

2 sets of ¾" x 1½" loose-pin hinges

knobs

Tools

tape measure or yardstick

utility knife

metal ruler

hand saw

staple gun

screwdriver

1" finishing nails (wire brads)

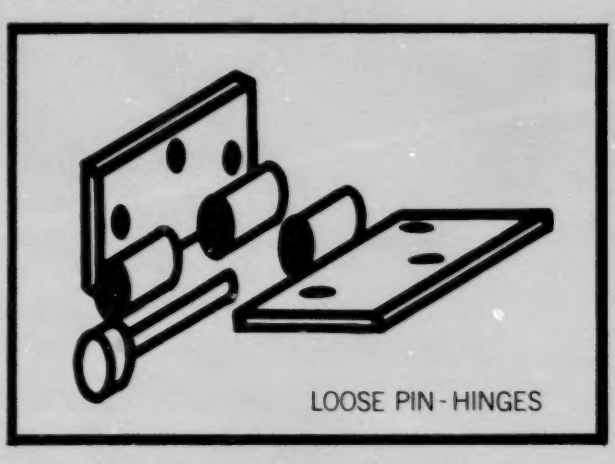
fine black marking pen

32

1. Measure the length (L) and width (W) from inside to inside of the window trim. To figure out how much Thermoply® you will need, multiply the length times the width and then multiply by two. For the frame wood, buy an amount equal to four lengths and two widths. The sill wood (prevents the shutter from closing too far) should equal the width of the sill.
Note: *The edge allowance used in cutting the Thermoply® gives you some leeway if your window opening is slightly out of square. However, if your window frames are really sagging, we suggest that you don't make these shutters.*
2. Before you transfer the measurements of your window opening to the Thermoply® sheet, subtract ⅜" from the length and ¼" from the width to allow room for clearance. Now, draw your pattern on the Thermoply® with a fine black marking pen and metal ruler.
3. Tape the metal ruler along the line and carefully cut with a sharp utility knife. Although the cardboard is only ⅛" thick, you will probably have to go over each cut more than once.
4. Move the ruler to the next line and finish cutting the panel. Then, using this panel as your pattern, trace and cut out a second panel, or put one together from scraps (see Step 4, Pop-in Shutter).
5. Carefully measure half the distance across a panel and make a mark at both ends. Using the utility knife and taped metal ruler, cut the panel in half. Repeat for the second panel.
6. Using one of the panels as your guide, cut 8 pieces of ¾" x ½" pine to form two rectangles the same dimensions as the panel.
Everything is now ready for assembly.
7. Place one of the panels on a flat surface. Lay 4 pine strips on the outer edge of the panel to form the frame. Make sure that none of the pieces extends beyond the edge. Now, apply adhesive to each piece of pine and glue it in place. Allow to dry.
8. Turn the panel and frame over and staple along the frame for a stronger bond.
9. Turn the panel so the wood is once again facing up. Apply glue all the ay around the frame. Press the second panel firmly in place. Allow to dry. Staple.
10. Assemble the second shutter.
11. Decorate the room side of the shutters with the fabric or covering of your choice. The outer face should be left uncovered to reflect back sunlight in the summer. Add knobs so that your "wall" can be turned back into a window at sunrise.
12. Fasten two sets of ¾" x ½" loose-pin hinges 6" from the top and bottom of the shutter.
13. Add "V"-type weatherstripping to the hinge edge of the shutter and along the top edge.

Installing the shutters

1. Place a scrap piece of Thermoply® under each shutter while holding it in place. Mark the location of both hinges against the inside of the window.
2. Remove the pins from the hinges and separate the two pieces. Take the loose piece and fasten it to the trim, using an awl to start the screws.
Note: *If your window trim is made of metal, you will have to drill holes for the screws and use metal self-tapping screws.*


LOOSE PIN - HINGES

3. Mount the shutters by slipping the hinges together and reinserting the pins.
4. Nail a strip of ¾" to 1" pine with a weatherstrip to the inside of the sill so that the shutters close tightly against it and remain flush with the window trim.
5. The shutters should be slightly too wide for the space so that moderate force is required to close them. If your shutters don't fit snugly enough, add a piece of weatherstripping to the meeting edge of one. If that doesn't do, install a cabinet "bullet catch" at the bottom of one of the shutters.

INSULATING CURTAINS AND DRAPERIES

Properly designed and used, curtains and drapes can be an effective, practical and attractive way to insulate your windows. In this section, we present four strategies for making your existing curtains better insulators. You can opt for any one or use a combination of techniques. You'll also find some hints that will help if you're thinking of buying new curtains or drapes.

To be an effective insulator, the curtain should incorporate the same basic features of all movable

insulators, as described in "Anatomy of a Window Insulator" at the beginning of this chapter.

Liners

The simplest way to increase the R-value of your curtain is to hang a second layer behind it. This liner can be a tightly woven, light-colored, sun- and moisture-resistant fabric, an aluminized fabric such as Milium®, or a reflective plastic film. The material can be pinned or sewn to the top or hung from the curtain hooks. (**Note:** *Some plastic films cannot be sewn.*) By hanging free, the liner creates an additional air space. If the liner is reflective, it will bounce back radiant energy in winter and sunlight in summer.

Bottom Seals

Bottom seals are needed to keep cold air trapped behind the curtain.

- Attach a flexible magnetic strip to the inside of the curtain liner hem. Mount the corresponding strip on the wall or the edge of the trim below the window. If the liner is thin enough and the magnet strong enough, you may be able to sew the strip inside the bottom hem.
- A clamping bar, elastic cord or weighted stick can be used to seal the bottoms at the sill or the floor.
- Putting a length of curtain chain inside the bottom hem is a good way to seal a floor-length curtain that drags and closes in folds.

Note: *If there are heating and cooling ducts directly beneath the windows, curtains should* not *be sealed* over *them. Install a deflector (available at hardware stores) and seal the bottom edge of the drapes in the trough behind it.*

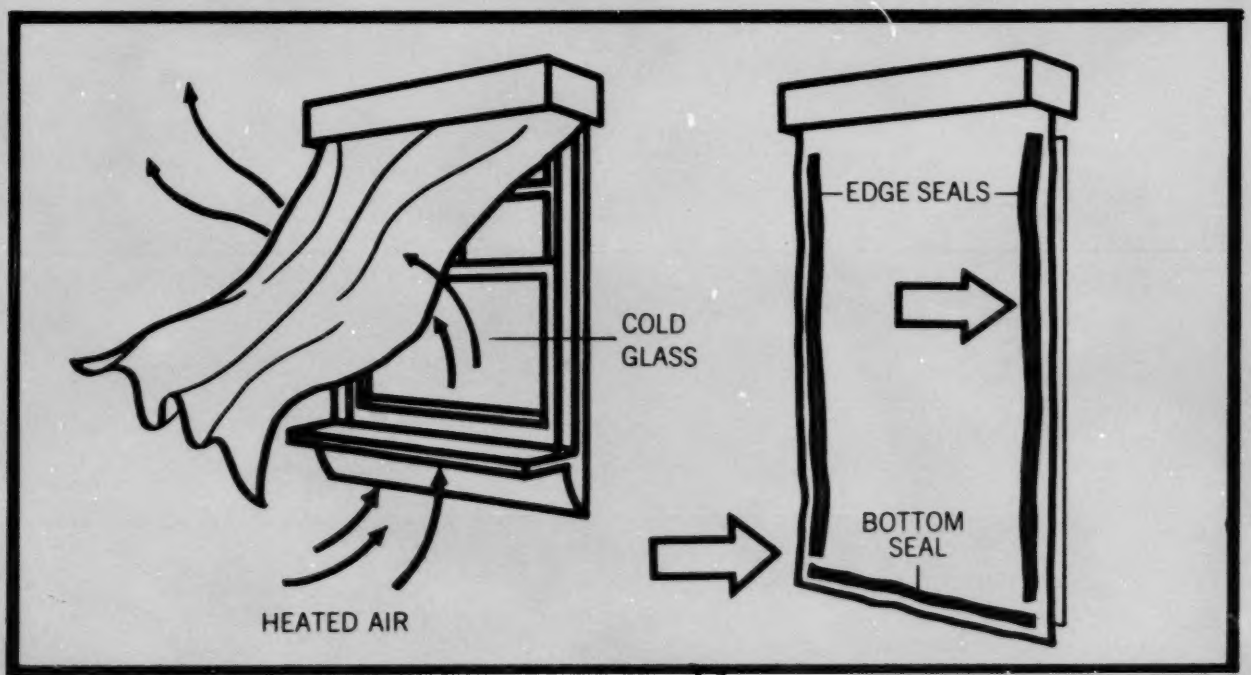
Side and Center Seals

Without side and center seals, heated room air gets in behind the curtain where it is cooled and condenses on the glass. The cool air then returns to the room to be heated once again, eating up more of your fuel dollars.

Permanently seal one or both sides of the curtain to the wall by screwing a thin wood strip over the curtain.

Temporarily seal the sides with:

- Slipcover tape—Purchase two fabric strips with snaps, double the length of the window. Machine stitch one of the strips of tape to the side hems of the curtain. Snap the other on to the tape you've just sewn and rehang the curtain. Now press the strips against the edge of the window trim or wall. As you unsnap the tape, thumbtack or staple the wall strip into place for a perfect alignment.

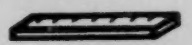
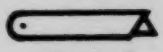
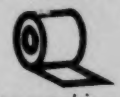


• Double-face carpet tape—Cut pieces of tape the length of the side trim and press it into place. Remove the outer protective paper and press the curtain to the tape.

The center of the curtain is more difficult to seal since it's limited to the reach of the person who closes or opens the curtain each day. Flexible magnetic strips sewn onto the meeting edges of the curtains seem to offer the best solution.

Top Seals

Top seals are important for keeping warm, moist room air from condensing on the glass in winter and for keeping hot outside air from entering the room in summer.

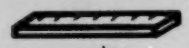
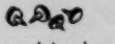
Tools	Materials
 ruler or tape measure scissors or  utility knife stapler and staples or thumbtacks	heavy cardboard (use recycled boxes)  duct or masking tape

A cardboard cover

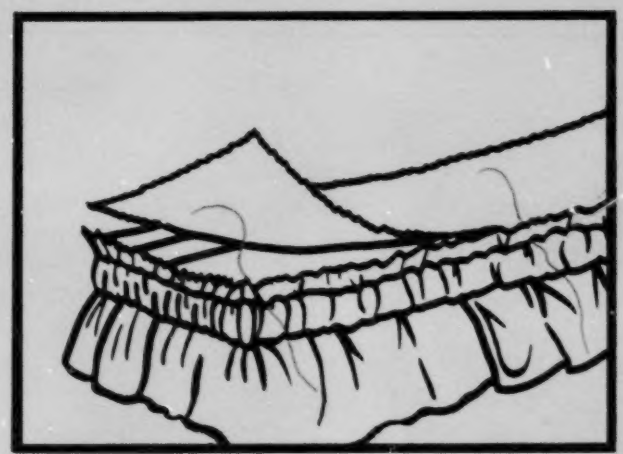
1. Measure the distance between the top rod and the wall. Measure the length of the rod.
2. Tape or staple pieces of cardboard together until the needed length is reached. Cut to the needed width. For better blockage, cover the cardboard with self-stick vinyl.
3. Staple or thumbtack one edge of the cardboard along the top of the window casing, resting the other edge on the rod. A cover is now formed to stop air currents.

A cloth cover

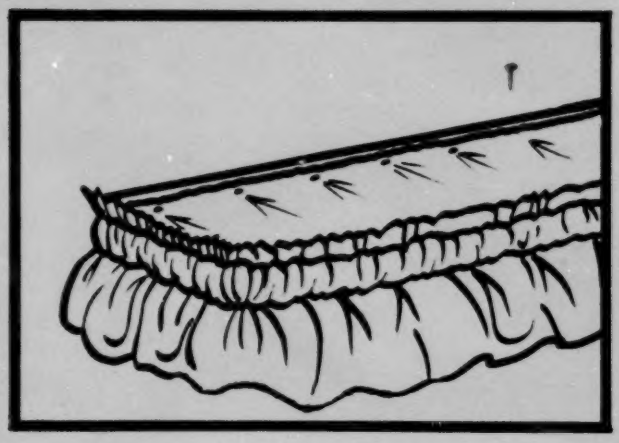
You can adapt your valance by sewing sturdy, firmly woven cloth across the top to form an "awning", and then stapling or thumbtacking the free edge to the top of the window casing.

Tools	Materials
 ruler or tape measure sewing machine (can also be sewn by hand) heavy-duty stapler and staples or  thumbtacks	sturdy fabric thread

1. Measure the length of the valance and add 2" for side hems. Measure the distance between the valance and the wall and add 1" for the hem. Cut fabric to size.
2. On each end, stitch a ½" double hem. On one long edge, turn under and stitch a ½" double hem.
3. Place the material so that the unfinished edge is at least ⅛" from the top of the wrong side of the valance. Be sure that the material doesn't interfere with the rod casing or other fastening that holds the valance to the rod. Baste or machine stitch the material in place.



4. Rehang the valance. Thumbtack or staple the remaining edge of the material to the window casing.



(**Note:** *Both the above adapted from Conn. Extension Service instructions.)*

Tip

Curtains can be effective in non-window situations too!

- Use over doorways and archways where a door has been removed or cannot be easily installed.
- Use curtains over sliding glass doors.
- Hang a heavy curtain, tapestry or rug over a cold exterior wall.

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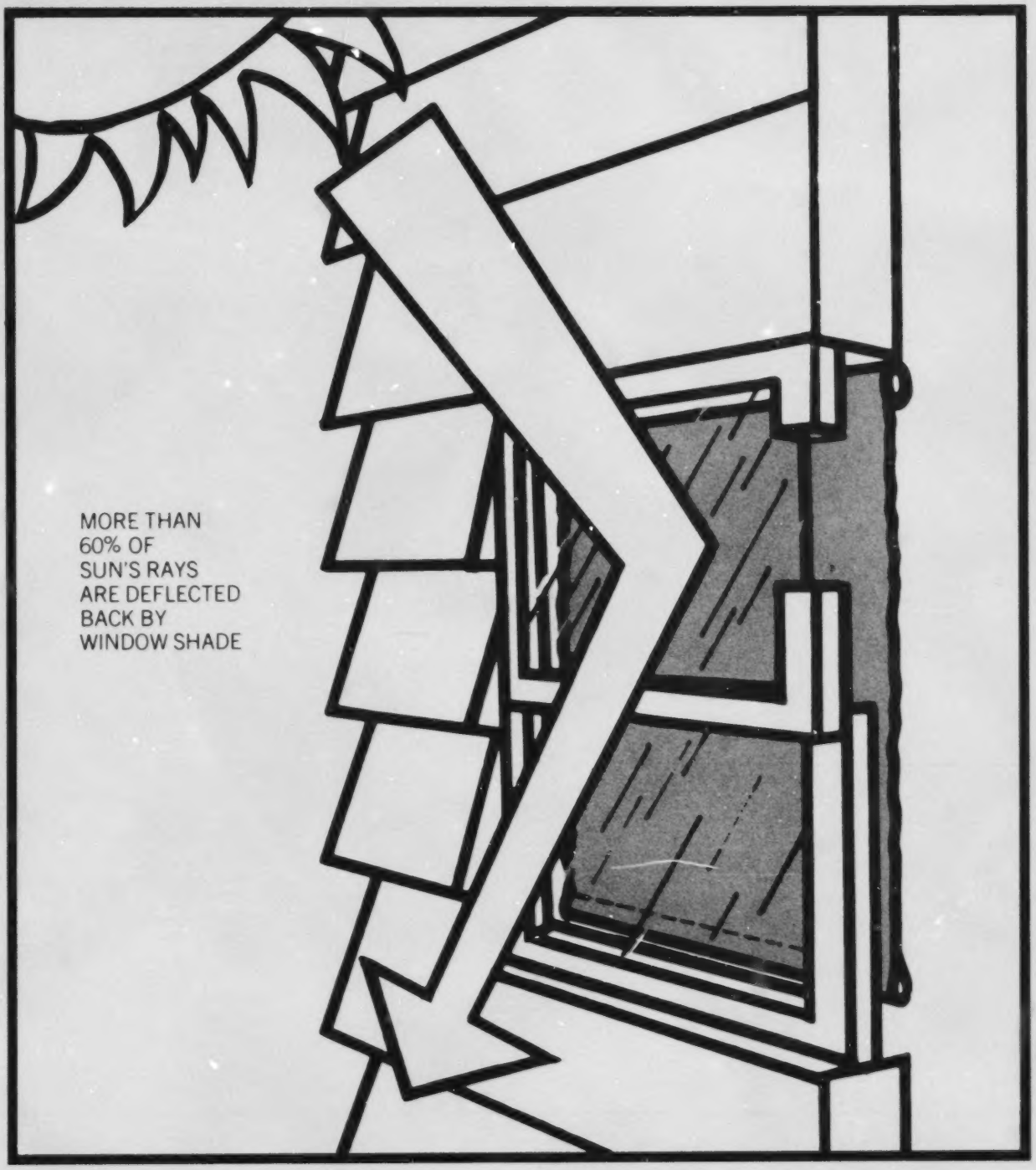


SUN SHADING OPTIONS

In this chapter, you will find a variety of ways to make your home more comfortable in summer and keep air conditioning bills low. The techniques presented here are applicable to all regions of the country, but should be of special interest to residents of the Sun Belt.

The sun shading devices we describe are effective as movable window insulators because they block heat from entering the room. In summer, the heat coming through a sunny window can be more than ten times that of an adjacent wall. In addition, sun shading devices give you the flexibility of adding insulation where and when you need it. By using easily removable shading devices or carefully designed permanent features, you have the benefit of shading your windows in summer and allowing those same windows to collect sunlight in winter.

As a rule, OUTSIDE shading devices, such as awnings, are the most effective because they intercept the sunlight before it can reach the window.

But INSIDE treatments, such as shades, shutters, and special films that are applied directly to the window, can be a big help, too. You might also consider LANDSCAPING for a "natural" solution to some of your shading problems.

As an added cooling measure, open all your windows to create cross ventilation. A whole-house attic fan is another excellent cooling device. It pulls the cool air through the house and the hot air up and out, facilitating cross ventilation.

INSIDE SHADING OPTIONS

Many of the insulating window treatments presented in the last chapter can be equally effective as summer shading devices. One disadvantage is the blocked view.

Shades

Following are some suggestions for roll-up shades that either block the sun completely or keep out most of the sunlight while still allowing you to see through. For instructions on how to adapt an old shade or make a new one, see the chapter on Insulating Window Treatments.

Room Darkening Shades

By using an aluminized plastic film, such as Mylar©, you can make a shade which will reflect back most of the sunlight striking the window. If the material is shiny on both sides, it will also bounce heat back into the room on winter nights. Aluminized plastic film can also be installed as a second sheet behind your regular shade or as a free-hanging liner behind curtains (see Insulating Window Treatments).

Note: *These films cannot be sewn; they must be stapled or taped.*

Light-Filtering Shades

By using a special "sun control" film now on the market, you can make a roll-up shade which will block up to 75% of the sunlight entering your window. This reflective film, which has a darkening effect like sunglasses, helps to prevent fabric from fading, cuts down glare, and gives you daytime privacy while allowing you to look out. Before purchasing the film, you should make sure that the brand you choose is recommended by the manufacturer for use in roll-up shades.

In southern regions, you might consider applying this film permanently to the glass of your *west* and *east* windows to filter the strong, direct rays of the sun.

Applying the film permanently is impractical in other parts of the country, since it would have to be removed from *all* windows every winter to take advantage of solar gain. A reflective film shade makes much more sense.

Adjustable Shades

Vinyl window shades that can be adjusted to fit the width of your windows are also available as room darkening or light filtering shades. The roller can be made to fit the inside of any window frame. The shade itself is trimmed to size by pulling a tab and discarding the excess.

OUTSIDE SHADING OPTIONS

Exterior shading devices are more effective than interior shades or drapes because they block the sunlight before it hits the window.

Roll Blinds and Shades

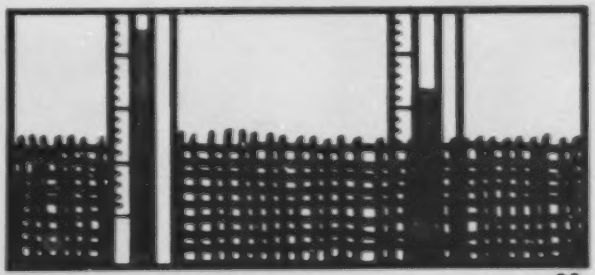
Simple roll blinds of bamboo, reed, or vinyl are the cheapest and easiest to install. Woven reed, purchased in 15-foot-wide rolls, can be placed in wooden frames or hung on hooks so it can be rolled up. This versatile material can also be made into blinds for sliding glass doors or windows. The blinds ride on casters at the bottom and are slipped through a recessed channel at the top.

All blinds will eventually rot when exposed to the elements. For preventive care: roll up the blinds after they are completely dry; lash them down so they won't flap and tear; replace frayed cords before they break; and store your blinds during the winter and long rainy periods.

You can also make outside shades from canvas, shade cloth, burlap, or any fairly durable material. Canvas shades give a tailored look, and offer the options of spring-tension, roll-up or crank operation.

Fiberglass Sun Screens

Proper ventilation and shading can substantially cut down on your air conditioning load. New, inexpensive fiberglass screens with a special weave can be easily installed in place of regular screens to shade open windows and keep out insects.



These screens block out 75% of the heat and glare, yet allow in light. The effect is somewhat like looking through tinted glass or sunglasses. These screens should be removed in the fall when you install your storm windows.

Awnings

Awnings are especially good energy savers because they stop the sun's rays before then can enter your home. A fabric, metal, or fiberglass awning can lower indoor temperatures 8° to 15°, and reduce your air conditioning load by as much as 25%.

Awnings are available in a variety of materials and styles to fit all window types.

LANDSCAPING

Trees, a flower-covered trellis, or an arbor laced with vines are some of the "natural" summer shading alternatives.

Trees

Trees help keep a dwelling cool in two ways: by blocking direct sunlight, and by keeping the ground and air in the shaded area cooler, thus slowing heat flow into the house.

The amount of shade provided depends on the type of tree you choose. Deciduous trees, such as poplars, give good shade in the summer and let sunlight through in the winter, once they drop their leaves. Evergreens also provide excellent shade, with no leaves to be raked in the fall. However, if they are planted on the south side, this advantage is probably far outweighed by the amount of solar energy you lose. Lower shrubs are useful on the west and east sides of the house to block the sun's low-angled rays in the morning and afternoon.

Trellises

Since trees generally grow slowly, it may pay to choose varieties which grow up to 3 feet per year. Another solution is to build a vertical or horizontal trellis and train deciduous vines, such as American bittersweet, Chinese wisteria, muscadine, or Lady Banks rose. You can enjoy their foliage, flowers, and fruit during the summer and still have the area open to the warming rays of the sun in the winter.

Evergreen vines such as yellow jasmine and evergreen pyracantha can be used for a shade all year long but, as with the evergreen trees, if they are used on the south side, the winter loss of solar energy is significant and will increase the dwelling's heating load.

Removable trellises can be made to fit the inside of sunny windows to hold vines during the summer months, or you can use lots of hanging baskets instead.

Arbors

If you have a sunny terrace, deck, or garden that needs shading, or would like to build a shaded summer deck that admits sun during the winter, a vine-covered arbor could be for you. Constructing an arbor requires carpentry skills and a good set of plans. It is advisable to check with your local zoning board before you begin, since a permit and inspection may be required.

The same vines listed in the trellis section are suitable for arbors, in addition to grape vines which will give you the added benefit of fruit. Ask your local nursery about varieties suited for your area.

Place your arbor on either the west or south side of the dwelling. Arbors on the east side will only get sunlight during the cooler morning hours and north side arbors provide no shading benefits. A west-side arbor provides the best shading in the summer for both the house and anyone using the terrace or deck during the hot afternoon.

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42

DOOR TREATMENTS

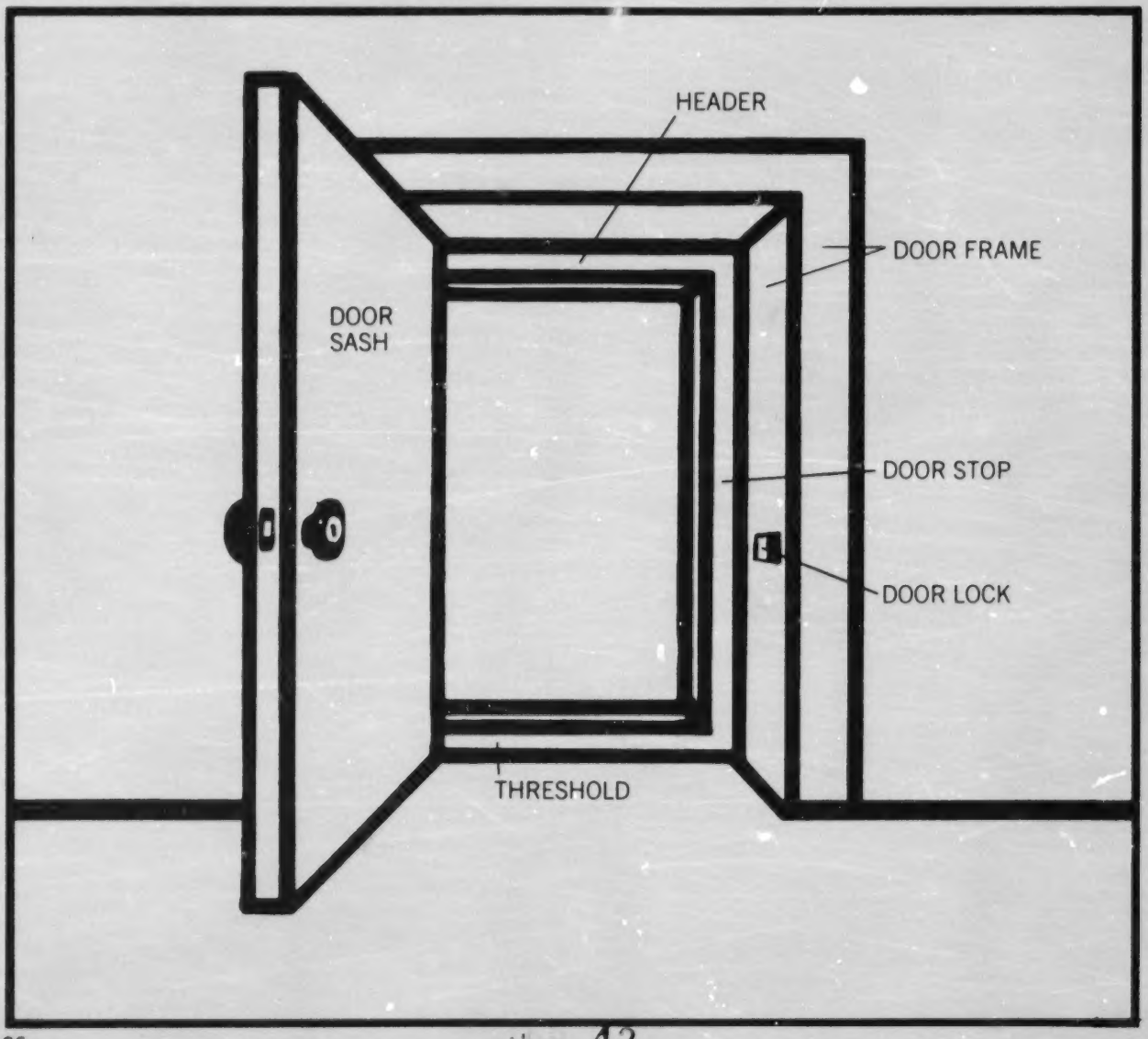
Doors, like windows, are big energy losers. While a wooden door will generally lose less heat than an average window, door leaks still put a significant strain on heating or air conditioning systems. You would never dream of allowing a 6-inch square hole in the middle of your front door to go unrepaired. Yet an innocent-looking ⅛-inch space between a door and its frame provides an escape route for the same amount of heated or cooled air as that 6-inch hole! Clearly, to save energy and dollars, caulking and weatherstripping your exterior doors are a must. You'll find complete instructions on caulking around doors in the chapter on Caulking.

Weatherstripping interior doors is useful, too, since it stops the movement of cold or warm air from room to room. Tightening up your inside doors will enable you to isolate much-used rooms from the rest of your home so that heating and air conditioning can be concentrated where they are needed most.

In this chapter, we describe a number of easy-to-install plastic alternatives to the traditional spring metal weatherstripping for the tops and sides of doors. To seal door bottoms, we have selected the simplest of the available options.

Once you have caulked and weatherstripped a door, you may wish to add a storm door—a wooden one with 50% glass will almost double the R-value of your present door. Aluminum storm doors are not as effective, however, because the metal frame conducts heat so readily. At the end of this section we present some less expensive, do-it-yourself ways to add insulation to your doors.

ANATOMY OF A DOOR



WEATHERSTRIPPING

Two types of weatherstripping are regularly used to seal a door. For the smaller spaces around the top and sides of the door, a window-type weatherstripping is adequate. Larger gaps at the bottom of the door require a more heavy-duty weatherstripping to withstand the wear from repeated opening and closing.

Around the Door Frame

Flex and "V"-shaped plastic—two inexpensive alternatives to spring metal weatherstripping—are recommended for use around the top and sides of a door. Because these strips attach to the door frame with self-stick adhesive rather than nails, they are easier to install than metal, and they are suitable for use on metal frames as well as wood.

The flex strip is available in a kit specially designed for use on doors. The "V"-shaped plastic is packaged in rolls and can also be used for windows.

Note: *Some paints resist adhesives. If the weatherstripping does not stick well to the door frame, reinforce it with staples.*

Preparing the surface

1. Make sure the area around the frame is free of all dirt, oily grime and loose paint. Use a putty knife, paint scraper or wire brush to chip away loose or flaking paint.
2. Scour the door frame with a good cleanser and a sponge or abrasive pad. Wait until the area is *dry* or the adhesive won't stick.

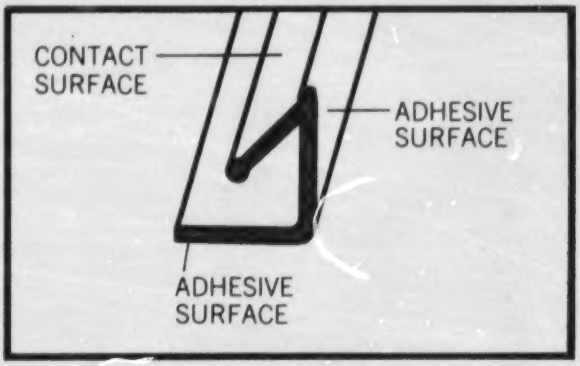
For doors that have been painted so many times that they don't close properly, weatherstripping will be of little value until you make the doors fit their frames properly once again.

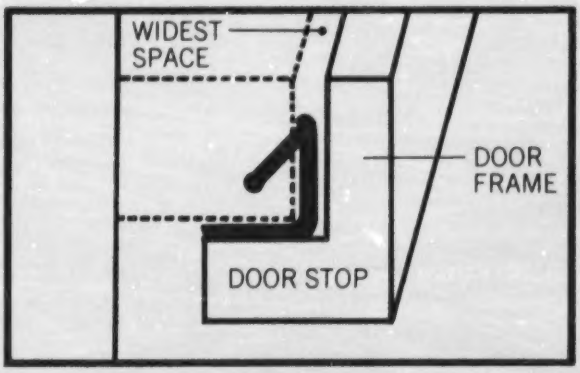
1. Use a Surform® plane to shave extra paint off the door at the points where the door rubs the frame.
2. Use a paint scraper—and lots of elbow grease—to remove excess paint around the door edge. Places where the paint chips off the face of the door during this cleaning can be filled with spackling putty. The door face may then have to be repainted.

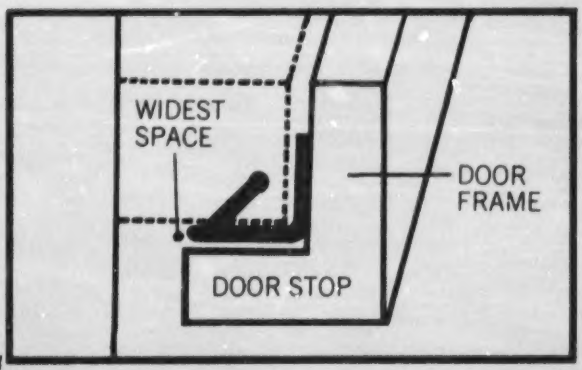
Flex Strip Door Kit

The flex strip has two adhesive sides. One side fits against the door frame, and one against the door stop. The flexible, hinged third surface contacts the door, and stops air and heat flow.

Check the space (1) between the door edge and the frame and (2) between the door face and the stop (see illustration). The flex strip should be attached so that the hinge of the strip fits in the wider of these two spaces.







Materials	Tools
flex strip door kit, including two pile corner seals for added protection at the bottom edges of the door.	scissors yardstick or metal tape measure

Installing the flex strip

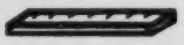
1. Install the weatherstripping at the top (header) of the door first. Cut the strip with scissors to fit the header. The corners may be either mitered or overlapped. For mitered corners, cut the ends of the top and side strips at a 45° angle.
2. Peel back about 3" of protective paper from the side of the strip between the hinge and the other adhesive side. Completely remove the protective paper from the remaining side.
3. Press the completely exposed adhesive surface against the frame or the stop.
4. When the strip is held in place with this adhesive, bend the strip slightly away from the stop or frame so you can remove the protective paper from the remaining surface. Release the paper gradually, 3" or 4" at a time, bending the strip away from the frame as you go along only enough to give you room to remove the paper. Press firmly into place.
5. For the sides, cut strips 2" shorter than the height of the door to allow room at the bottom for the corner seals. Install the side pieces as described in steps 2, 3, and 4.
6. Attach the pile corner seals last. Peel off the protective paper from the self-adhesive surface and press the corner seal firmly into place at the bottom of the frame.

"V"-Shaped Plastic

"V"-shaped plastic weatherstripping has a self-adhesive strip on one side. To form the "V" shape, simply fold the plastic strip in half, keeping the adhesive face on the outside of the "V."

Installing the "V" strip

1. Install the weatherstrip at the header of the door first. Cut the strip with scissors to fit the header. The corner may be either overlapped or mitered. For mitered corners, cut the ends of each strip at a 45° angle.

Materials	Tools
roll of "V"-shaped plastic weatherstripping	scissors  yardstick or metal tape measure

2. Fold the strip in half with the adhesive side on the outside of the resulting "V."
3. Peel back about 3" of the protective paper from the adhesive side of the strip.
4. Press the strip in place along the header, gradually removing the protective paper as you go. The point of the "V" should face the direction in which the door opens.
5. Cut two pieces to fit the sides. Attach to door frame by following directions in Step 4.

Door Bottoms

There are many ways to seal the space between the bottom of the door and the threshold. Some of the factors you should take into account in deciding which to use are the location of the door, the ease of installation, and the appearance of the door seal.

Outside doors require durable, tightly fitting weatherstripping. If you are willing to sacrifice appearance, you can mount the strip on the outside of the door where, in addition to blocking air flow, it will protect your entryway against rain and dust.

For interior doors, a less rugged and less noticeable bottom seal will do, since it must stop only internal drafts. In either instance, you should avoid door seals that require taking the door off its hinges for installation.

Door Sweeps

A door sweep is the easiest way to seal the bottom of a door. A sweep can be mounted on the inside or outside of the door so that its brush or plastic strip touches the floor or butts against the threshold. Some door sweeps are made with a flexible plastic mounting strip which enables you to adjust the sweep to allow for an uneven floor.

Installing a door sweep

1. Cut the sweep to the width of the door, using the hacksaw or scissors.
2. If the sweep has a self-adhesive strip, peel back the protective paper and attach the sweep

firmly to the bottom of the door. If it attaches with screws, first place the sweep into position at the bottom of the door, and make starter holes for the screws by pushing the awl or nail punch into the door through the holes in the sweep. Insert the screws.

Note: *The sweep should fit snugly against the threshold when the door is shut, but also permit the door to open and close easily. A self-adhesive sweep may need to be reinforced with tacks or staples to withstand repeated opening and closing.*

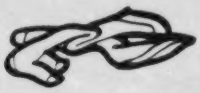
Materials	Tools
door sweep kit	hacksaw (for metal sweep) or scissors (for plastic) screwdriver awl or nail punch

Fabric Draft Stopper

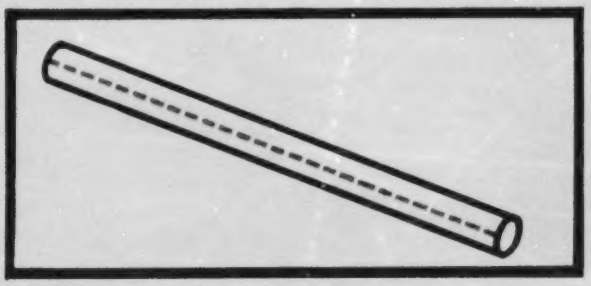
Environmental factors such as soil shrinkage or settling can sometimes result in new gaps under doors, even those that have been weatherstripped. To solve this problem, you can make a decorative fabric draft stopper, like the one designed by the Connecticut Extension Service.

This easy-to-sew, flexible tube can be filled with sand or other filler and placed across the bottom of the door. A loop at one end allows you to hang up the draft stopper when it's not in use. On inside doors, this simple and inexpensive device can block the movement of warm or cold air within your home.

Making the draft stopper

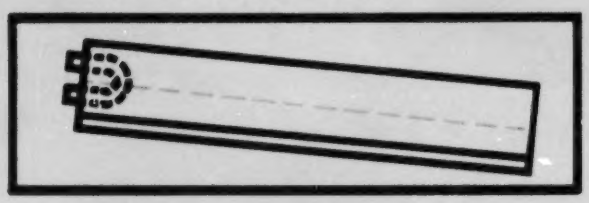
Materials	Tools
fabric for two tubes: inner tube—sturdy, tightly woven fabric, 5" wide and long enough to fit across door and frame plus 2"; outer tube—sturdy, deep colors, same measurement long, but 6" wide; loop (fabric, colored shoelace, etc.) heavy-duty thread	sewing machine (can also be sewn by hand)
	Materials sand (one pound per foot of fabric length) or  old nylons cut into strips, fiberfill, sawdust or cat litter.

1. Fold the inner tube material lengthwise, right sides together. Using a small back stitch, sew a 1" seam along the long edge and one end. If you're using a sewing machine, use small stitches and sew a double seam.



2. Turn the tube right side out.
3. Fill this tube with the filler of your choice. Make a paper funnel to fill easily with sand. The tube should be firm when filled, yet be able to bend.

4. Fold in the raw edges at the open end and stitch securely.
5. Fold the outer tube material lengthwise, right sides together. Insert the loop in one end.

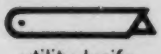


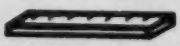
6. Use small back stitch to sew the long edge and the end with the loop.
7. Turn the tube right side out.
8. Work the filled inner tube into the outer decorative tube. The fit should be snug. Fold in the open end and stitch closed.

DOOR INSULATION

By adding insulation to outside doors you can increase their R-value and significantly reduce the loss of heated or cooled air. In addition to storm doors, there are several ways to cut down air flow through doorways.

Tools


utility knife


metal ruler

hand drill

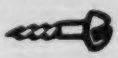
screwdriver

awl

marking pen

Materials

acrylic plastic sheet (0.08" thick)


#8 round-head screws (aluminum, stainless steel or brass)

piece of thick scrap wood

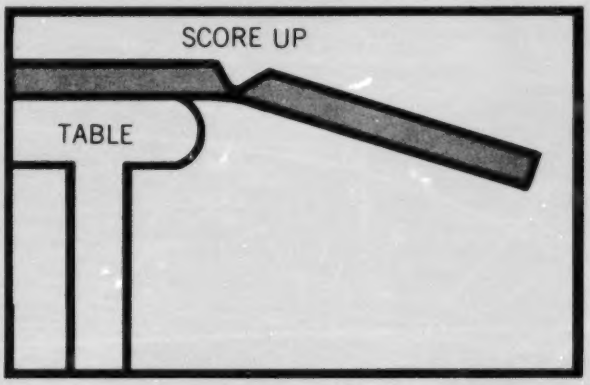
Note: *To avoid scratching the acrylic, use special care in handling it. Most acrylic sheeting comes with a protective overlay of polyethylene film. Do not remove the film until the job is done.*

Acrylic Panels Over Door Windows

The glass portion of a door is particularly vulnerable to heat loss. Covering the door windows with a sheet of acrylic plastic is one way to reduce heat loss. This rigid plastic is tougher than glass, although it does scratch very easily.

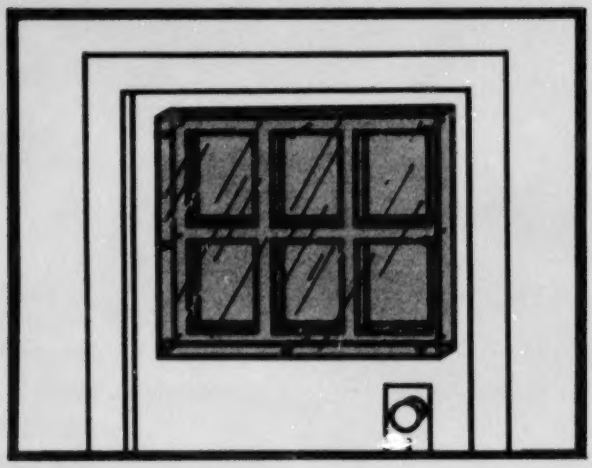
Installing the plastic

1. Measure the window portion of your door and add 4" to both the length and the width.
2. Mark a section of acrylic with these dimensions using a marking pen and metal ruler.
3. Tape the straightedge to one of the marked lines. Using a utility knife, score the plastic halfway through. This may take a few passes with the knife.
4. Place the panel on your work table so that the scored line is lined up with the edge of the table—keep the scored side facing up. Bend the plastic sheet down, away from the cut, until it snaps. Finish cutting the rest of the panel.



5. Drill holes for the screws. Using a drill bit slightly larger than the screw, drill a hole in each corner, 1" from either edge. Place a piece of scrap wood under the work so the drill bit enters the wood after passing through the acrylic sheet.
6. Space holes around the perimeter of the sheet about 6" apart, and 1" in from the edges.
7. Hold the plastic over the window on the inner face of the door. Mark the door through all the drilled holes.
8. Using an awl or a drill bit thinner than the screws, make starter holes in the door for the screws. Be careful not to drill completely through the door.
9. Clean the acrylic with a mild detergent and water, using a damp, soft, lint-free cloth. Rinse and allow the surface to air-dry. **Note:** *Make sure the door windows are clean before installing the plastic.*

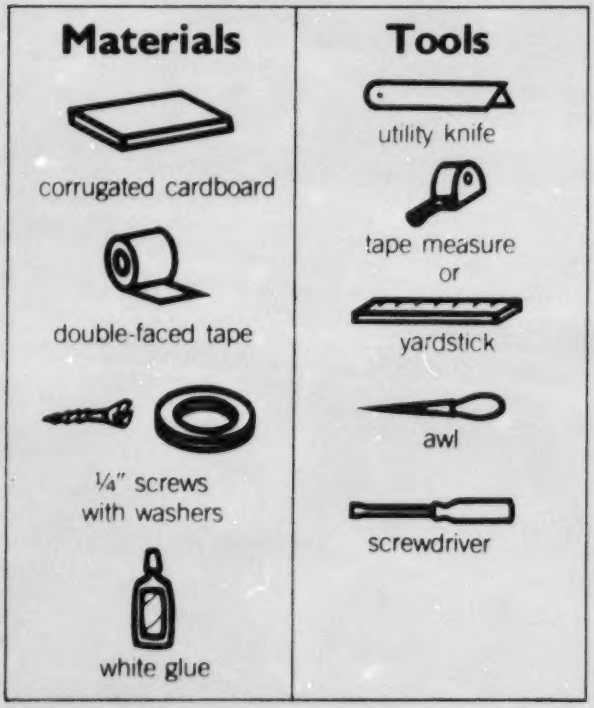
10. Screw the acrylic sheet to the door. Don't screw too tightly, or you may crack the acrylic.



*Cardboard Panels on Door Face — A Low-Cost Insulation Step

A particularly cold and drafty outside door can be insulated very inexpensively by adding a corrugated cardboard panel to the door's inner face. After the cardboard has been installed, it can be painted or decorated with the covering of your choice. Refrigerator or furniture cartons are an excellent source of double-thickness cardboard.

Installing the cardboard



1. Measure your door and add 2" to both width and height to cover gaps between the door and the frame.
2. Cut a cardboard panel to these dimensions, or tape smaller pieces together to fit these measurements.
3. Cut a hole for the door knob and cut slots for the hinges.
4. Attach the panel to your door with double-sided tape. Push an awl through the cardboard into the door to make holes to start the screws. To reinforce the tape attachment, use screws and washers every 12" around the perimeter of the door, about 2" or 3" in from the edges.

THE "FORGOTTEN" DOORS

Don't neglect attic entranceways, cellar and garage doors, and sliding glass doors.

Attic entrance ways

Weatherstrip the entrance to the attic in the same way you would a door. Treat the opening as if it were the door frame. Enter the attic and close the stair. Attach vinyl-clad foam weatherstripping to the attic frame so that it butts against the stair when the stair is closed into the ceiling.

Cellar doors

Use vinyl-clad foam weatherstripping for this job. Treat bi-fold cellar doors as you would casement windows (see Window Weatherstripping), sealing around the inside edges of the door frame and where the two doors meet. If foam is too thick for the meeting edge, use "V"-shaped plastic weatherstripping on one edge.

Garage doors

Some companies manufacture a special vinyl weatherstripping in 9-foot and 16-foot lengths for the bottoms of garage doors. Sealing off an attached garage provides one more buffer between the living area of your house and the outside climate.

Sliding glass doors

Use a vinyl-clad foam strip, or flex, or "V"-shaped weatherstripping at the sides of the frame where the door meets the frame. Sliding glass doors are really just large sliding windows. After you weatherstrip them and caulk around the frame, refer to the chapter on Insulating Window Treatments for ideas on how to keep this large expanse of glass from being a major source of heat loss or gain.

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NOTES:

INSULATION

Added with discretion, insulation can save energy and dollars in all regions of the country. When it's cold, insulation prevents heat from escaping through ceilings, floors and walls to the house's unheated spaces—attics, garages, basements—and, ultimately, to the outdoors. When it is warm, insulation keeps the outdoor heat from flowing through the house into the rooms you wish to keep cool.

Because its primary characteristic is the ability to resist heat flow, insulation is usually measured in terms of resistance or R-value, not inches; **4½ inches of insulation with R-4 is just as effective as 6 inches of R-3.**

If your house was built after 1940 it is likely to have some insulation. Whether you add more will depend on the R-value and condition of your present insulation and the region in which you live. Since insulation is fairly expensive, your decision on where and how much to insulate may also depend on whether you can do it yourself or have to hire a contractor.

In this section we present four insulation projects that you can do yourself: (1) unfinished attic floors; (2) crawl spaces; (3) attached garage walls and ceilings; and (4) unfinished basement ceilings. These projects were selected because they are the easiest and least expensive insulating jobs to do. The projects are listed in the approximate order of energy savings. Thus, while the exact fuel savings will vary by region, insulating your attic is the most energy-efficient of the four projects and should be done first.

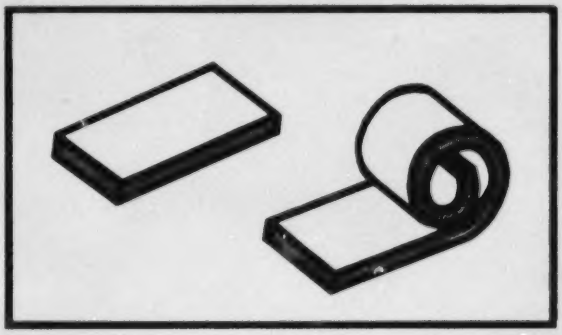
For some jobs, such as insulating your exterior walls, you will have to hire a contractor. In case your contractor omitted adequate moisture protection (vapor barrier), you can remedy this yourself. See the end of this section for suggestions. We have also included some tips on how to insulate cold walls from the room side.

Before you undertake any of the insulating projects, **you should check to see that the area to be insulated is free of leaks or excessive moisture. In addition, when insulating you must provide a vapor barrier and make sure that the space will be adequately ventilated.** Vapor barriers, such as polyethylene plastic or aluminum foil, are vital in order to stop warm, moist room air from seeping into the insulation where it can reduce the insulation's R-value and rot the wood structure of your home. All the projects listed in this chapter can be done with fiberglass or rock wool batts or blankets, which are available with a vapor barrier attached. If you are adding insulation to an area that already has insulation, *do not* use a vapor barrier, because you may trap moisture in the insulation.

Finally, there is some question about the safety of some insulating materials. These include cellulose fiber, which you can install yourself, and ureaformaldehyde, polystyrene, and polyurethane foams, which are contractor-installed. If you use cellulose fiber, check to see that it meets federal standards for fire resistance. Given the possible hazards, we *do not* recommend using the foams at this time.

Types of insulation

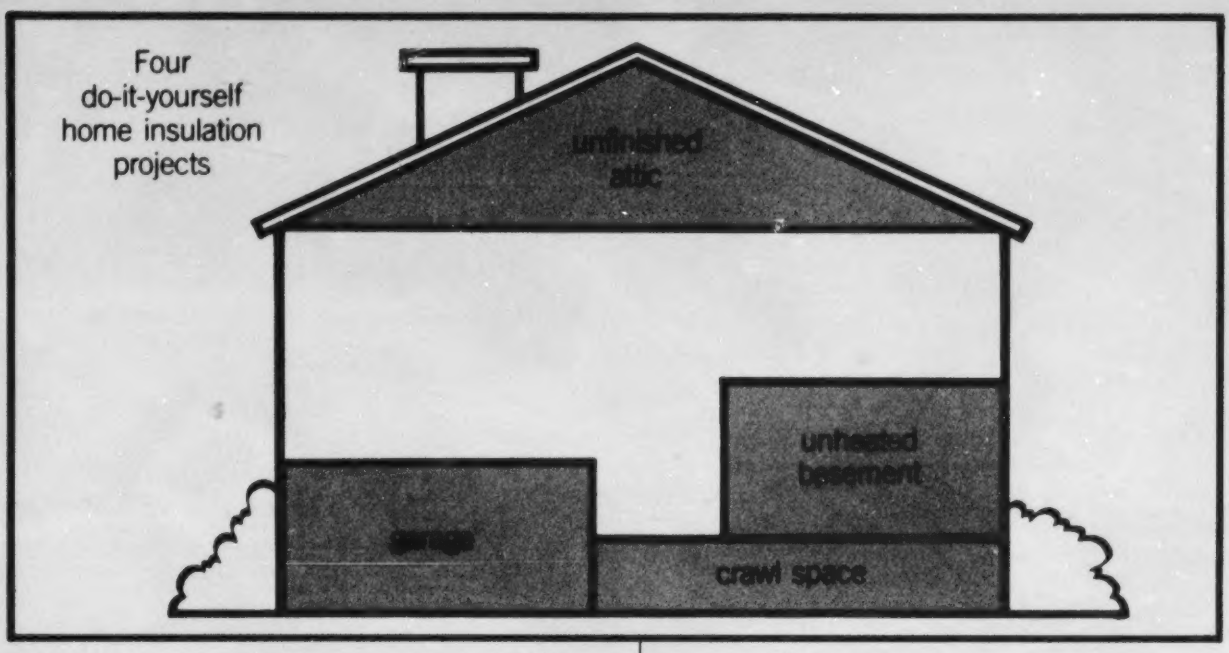
There are two types of insulation which you can use for the do-it-yourself projects described in this chapter: **1.** batts and blankets, which are cut and laid in place; and **2.** loose-fill, which is poured in.



1. Batts and blankets are made of fiberglass or rock wool and are available in standard thicknesses and widths pre-measured to fit between floor joists or wall studs. They are fire-resistant and can be purchased with or without a vapor barrier. The only difference between batts and blankets is that blankets are considerably longer and therefore a little more difficult to handle, but have fewer joints after installation.

2. Loose-fill insulation is made of fiberglass, rock wool, or cellulose fiber. Because they are poured in, loose-fills are best suited for use between floor joists that are not a standard distance apart. Rock wool and fiberglass are fire-resistant. Cellulose fiber has the best R-value, and is fire-resistant **if properly treated,** but it may break down in hot attics. All the loose-fills tend to settle somewhat in time, thus reducing their R-value. A vapor barrier should be installed prior to use of the loose-fills, unless you already have some insulation.

Caution: If you are putting down insulation where none existed before, a **vapor barrier**, facing



the warm, lived-in part of the house, is a **must**. If you are **adding** insulation where some exists already, a new vapor barrier is **not** needed and could cause more harm than good.

INSULATING YOUR UNFINISHED ATTIC

If you are going to insulate at all, your unfinished attic is the place to start. It is one of the easiest projects to do and the most cost-effective way to spend your insulating dollars. An uninsulated attic robs your house of heat when it's cold and stores heat when it's warm, thereby placing an added burden on your air-conditioning system.

Before you undertake this project, be sure to check for roof leaks in your attic. Look for water stains or marks and any signs of light showing through other than ventilation openings. If you find leakage, repair it before you insulate. Wet insulation is ineffective and can damage the structure of your home.

Preparing the attic

1. Put in temporary lighting and flooring. In most attics hanging a droplight from the rafter works best. Although you can walk on the narrow joists, temporary flooring is needed to prevent you from slipping between the joists; the ceiling below won't support your weight.
2. Locate all electrical wiring in your attic. Try to avoid unnecessary contact with it when you are installing the insulation.
3. Keep the insulation in its wrappers until you are ready to install it. The wrapping compresses the batts and blankets, thus making them easier to move and handle.

Installing the insulation

To determine the number of batts or blankets you will need, calculate the insulation area by multiplying the length times the width of your attic and then multiplying the total by (.9). Measure the distance between the joists to find the width of insulation to buy. (They're usually 16" or 24" apart.)

For loose-fill insulation, calculate the insulation area as above. Your insulation dealer can tell you how many bags of loose-fill you need to get the R-value you desire.

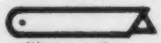
Materials

batts, blankets or loose-fill insulation;

vapor barrier—4-mil polyethylene plastic (for use with loose-fill, or if batts/blankets backed with a vapor barrier are unavailable)

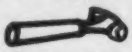
Note: If you are **adding** insulation on top of existing insulation, buy batts or blankets **without** a vapor barrier.

Tools



utility knife or heavy-duty scissors

heavy-duty staple gun and staples or



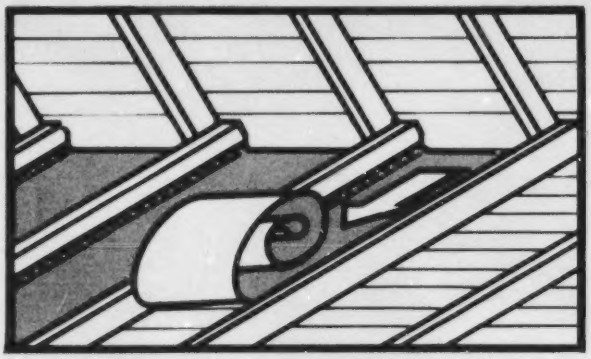
hammer and tacks

duct or masking tape (2" wide)

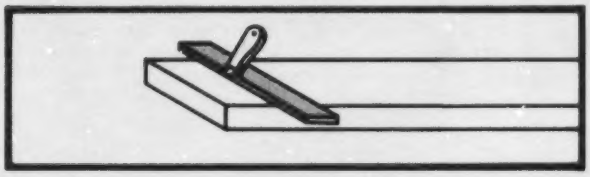
gloves and breathing mask

If polyethylene is needed, use the insulation area, but allow for some waste.

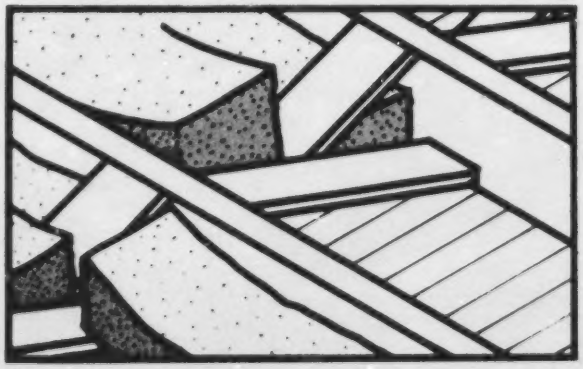
1. Install a separate vapor barrier *only* if you are using loose-fill or *unbacked* batts/blankets where NO insulation already exists. Cut the polyethylene into long strips about 4" wider than the width of the joist. Staple or tack the plastic in place. Either seal the seams with tape or overlap the seams by 6".



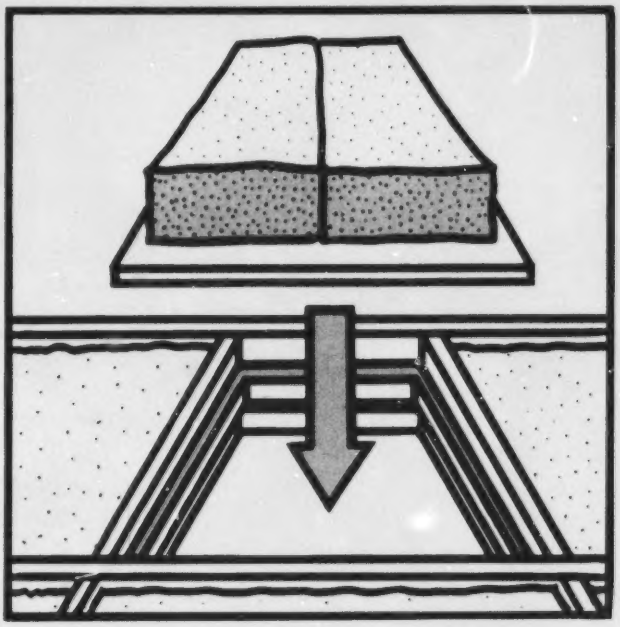
2. Starting at the eaves and working toward the center, lay the batts or blankets between the joists. (They should fit snugly.) If there is an attached vapor barrier, make sure it faces down, toward the lived-in side of the house. Any tears in the vapor barrier should be taped over. Slide the insulation under wiring wherever possible.



3. For blankets, cut long pieces first, using the leftovers for shorter spaces. If you are using a utility knife to cut the batts or blankets, lay a board across your cutting line and press it down to compress the insulation as you cut.
4. The space between the chimney and the wood framing should be filled with non-combustible material, preferably *unbacked* batts or blankets. Also, the National Electric Code requires that insulation be kept 3" away from light fixtures and other heat-producing equipment.

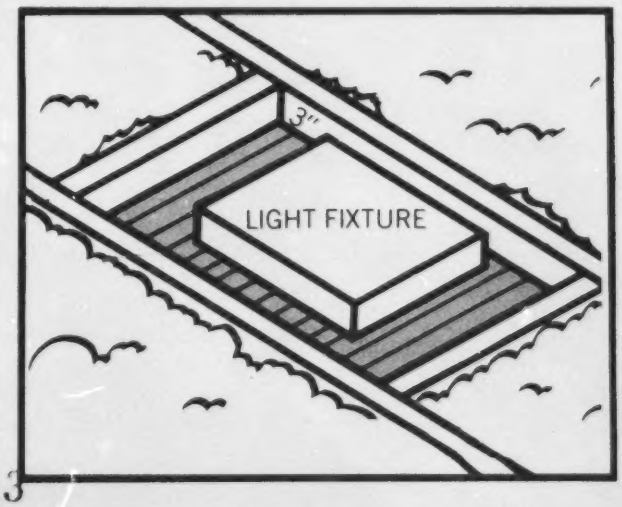


5. Cut ends of batts or blankets to fit snugly around cross bracing. Cut the next batt in a similar way to allow the ends to butt tightly together.
6. Don't forget the attic door. An access panel can be insulated by stapling a fiberglass batt, vapor barrier facing down, to the panel. A door with fold-up stairs is more difficult to insulate, but should be weatherstripped (see Doors chapter).



For loose-fill

7. Install polyethylene as in #1.
8. Staple a piece of batt or cardboard to protect each eave vent so that the loose-fill won't fall down and cover the vents, thereby blocking air flow into the attic.
9. Use pieces of batt or wood to block off the area around light fixtures. The loose-fill must be kept *at least* 3" from vents, lights or other heat-producing equipment.



10. Pour in the loose-fill to the depth needed for the R-value you want. (See chart of Recommended R-values for your area.) If you are covering the tops of the joists, a good way to get uniform depth is to stretch two or three strings the length of the attic at the desired height, and level the insulation to the strings.

11. Use a board or garden rake to even out the loose-fill. Make sure to fill all the nooks and crannies.

Note: Attic ventilation–*Adequate ventilation can help protect attic insulation and your home's structure from moisture damage, as well as reduce your air conditioning load. Attic vents should be left open all year round–be careful not to cover them with insulation.* **In summer,** *use a "whole-house" attic fan to pull cool breezes through your house and vent hot air out. In all but the hottest regions of the country, proper use of a whole-house fan can reduce or even eliminate the need for air conditioning.*

Safety

1. Provide good lighting.
2. Lay boards or plywood sheets down over the tops of the joists to form a walkway.
3. Avoid unnecessary contact with electrical wiring.
4. Be careful of roofing nails protruding through the roof.
5. If you use fiberglass or rock wool (batts, blankets or loose-fill), be sure the attic is ventilated, wear GLOVES, LONG SLEEVES, and a BREATHING MASK, and keep the insulation wrapped until you're ready to put it in place.

INSULATING YOUR CRAWL SPACE WALLS

Insulating your crawl space walls with batts or blankets is a doable project IF you have access to the area and adequate working space. If your crawl space walls already have some insulation, adding more will probably not be cost-effective. (Before undertaking this project, please read the information on ventilation which follows the directions.)

Note: *Residents of Alaska, Minnesota and northern Maine should not insulate with the method we describe. Extreme frost penetration due to a reduction in heat loss can cause heaving of the foundation if this insulation method is used.*

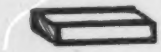
Preparing the crawl space

Put in temporary lighting. Open vents to provide ventilation while you're working. **Be sure to keep the light and all wires off wet ground.** If the floor of your crawl space is **very** wet, do not insulate!

Materials

R-11 (3"–3½" thick) blankets or batts of rock wool or fiberglass insulation

6-mil polyethylene plastic to lay on floor for vapor barrier

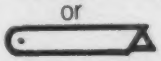


2" x 4" lumber, bricks or rocks to hold insulation in place on floor

Tools

heavy-duty staple gun and staples

heavy-duty scissors or



utility knife

metal tape measure

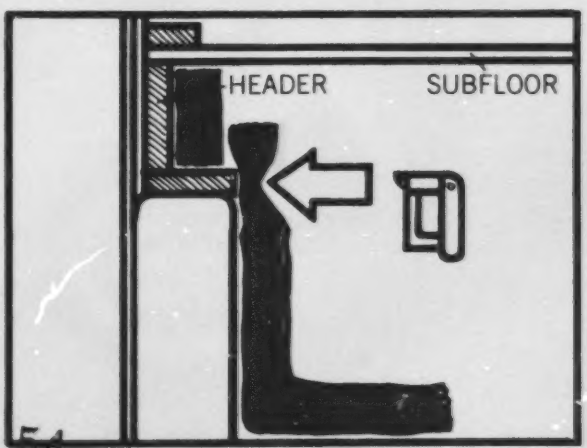
duct tape (2" wide)

temporary lighting

Installing the insulation

To determine the number of blankets/batts you need, calculate the insulation area by multiplying the height of the walls plus 3', times the length of the walls (L x (H + 3') = area). For the polyethylene, multiply the length of the floor plus 1', times the width plus 1' (L + 1) x (W + 1).

1. Where the joists run at right angles to the wall, press short pieces of insulation against the header. The batts should fit snugly and do not require stapling.



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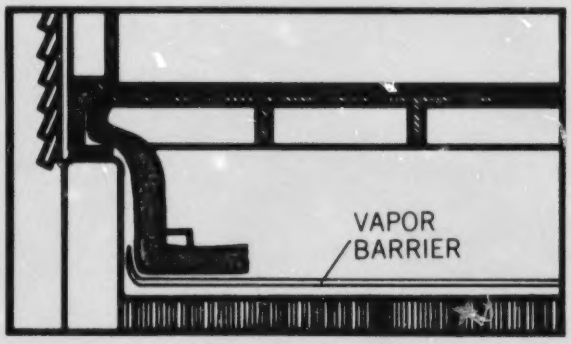
2. Install the wall insulation by stapling the top of each batt to the sill. Make sure that the batts fit snugly against each other, and that you cut them long enough to cover 2' of the crawl space floor.

3. Short pieces of insulation are not needed where the joists run parallel to the wall. Just staple the top of each batt to the band joist.



4. When all the insulation has been installed, lay down the polyethylene vapor barrier, tucking it under the batts all the way around the foundation wall. Turn it up about 6" against the wall. Tape any seams in the polyethylene or overlap seams at least 6".

5. Lay 2x4 lumber, bricks, or rocks along the way to hold the insulation in place. Plan your work to minimize stepping or crawling on the vapor barrier.

Note: Crawl Space Ventilation

Even with the vapor barrier there could be moisture damage (to both insulation and structure) **unless** fresh air is allowed into the crawl space from time to time:

1. If your crawl space is **heated** by your furnace, you need not worry about ventilation during the winter. In fact, you should shut crawl space vents in winter and open them again in summer. If your crawl space has no vents, run the blower of your furnace 3 or 4 times during the summer to keep the crawl space air from getting too damp.

2. All other crawl spaces should have vents that can be opened in summer and shut tightly during the winter.

If your furnace gets its combustion air from the crawl space, some vents should be left open all year round. Check with your service person or the local HUD/FHA office.

Safety

1. Provide adequate temporary lighting.
2. Wear GLOVES, LONG SLEEVES, and a BREATHING MASK.
3. Provide adequate ventilation.
4. Keep lights and wires well off the damp ground.

INSULATING YOUR ATTACHED UNHEATED GARAGE

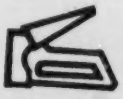
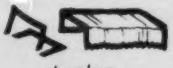
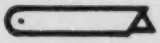
If your garage is part of the house, you should consider insulating the ceiling and/or wall(s) that adjoin the living area to prevent the garage from robbing the house of heated or cooled air.

Insulating Garage Walls

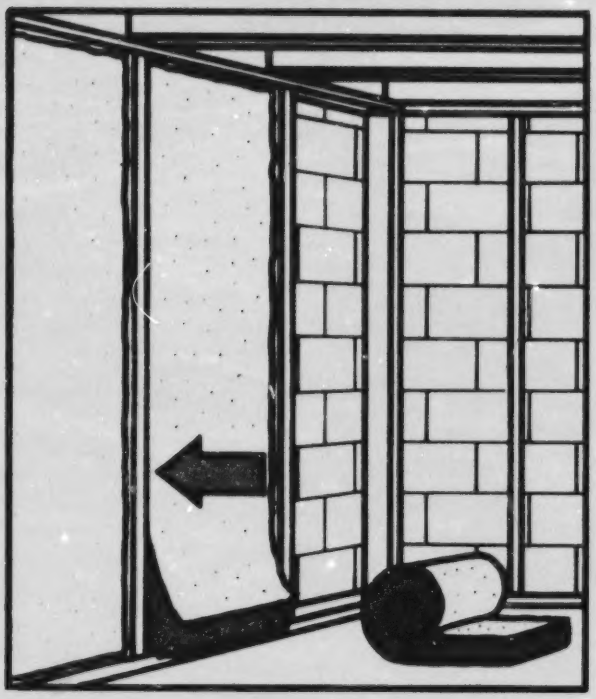
This is an easy project if your garage wall has wood studs and NO existing insulation. To install the insulation you simply staple batts or blankets to the studs. Leave the garage door open while you work and be sure that you have adequate light.

Installing the insulation

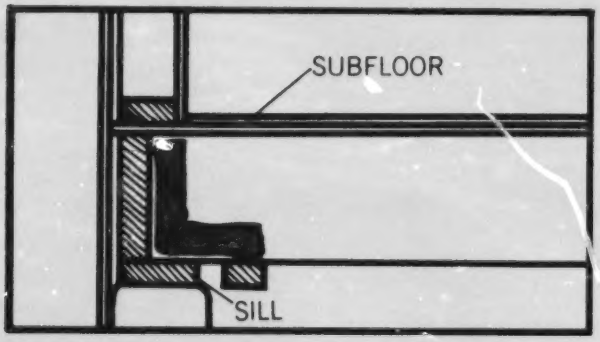
To determine the number of batts/blankets you need, multiply the height of the wall times the length. Measure the distance between the studs to find the width of insulation to buy.

Tools	Materials
 heavy-duty staple gun and  staples metal tape measure heavy-duty scissors or  utility knife	R-11 (3" - 3½" thick) batts or blankets of fiberglass or rock wool insulation with vapor barrier

1. Cut batts/blankets into sections the height of the wall. Staple them to the studs. The vapor barrier should face the lived-in side of the house.



2. If you are not insulating the garage ceiling, install small pieces of insulation against the header between the sill and the band joist.



Safety

1. Provide adequate lighting and ventilation.
2. Wear GLOVES, LONG SLEEVES and BREATHING MASK.

Insulating the Garage Ceiling (House Floor)

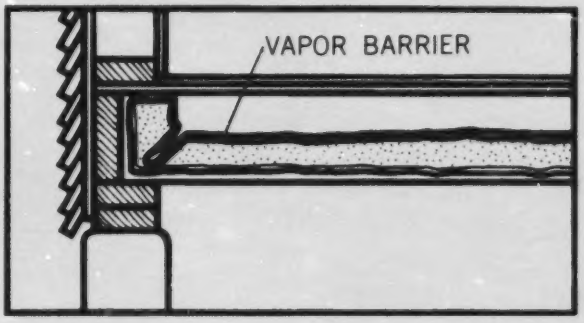
If you won't mind working on a ladder, this can be a relatively easy job. To keep the insulation in place, you attach wire to the bottom of the joists. Leave the garage door open while you work and be sure that you have enough light.

Installing the insulation

To determine the amount of insulation you need, multiply the length times the width of the ceiling. Measure the distance between the joists to find the width of insulation to buy.

Tools	Materials
hammer 4- or 6- penny nails metal tape measure heavy-duty scissors or utility knife	batts/blankets of fiberglass or rock wool insulation **with foil backing** (see chart for recommended R-value); light-gauge tie wire (available in rolls)

1. Push the batts/blankets up between the joists with the vapor barrier (foil) facing up, toward the house floor. The insulation will stay in place until the wire is attached underneath.
2. To insulate the header between the joists, fold one end of the batt — it should fit snugly against the bottom of the floor.



3. Hammer nails halfway into the bottom of each joist about 2' apart. Wind the wire back and forth between the nails in a criss-cross pattern.

Note: *There are several other ways of holding ceiling insulation in place. Wire mesh or chicken wire is a more expensive but somewhat more attractive alternative to the method described above. The mesh or chicken wire is stapled to the bottom of the joists under the insulation. Another option is "tiger teeth", precut pieces of wire available from many insulation dealers. These are slightly longer than the joist space and are arched to press the insulation more firmly into place.*

Safety

1. Make sure you don't block your furnace's combustion air vents.
2. Provide adequate lighting and ventilation.
3. Wear GLOVES, LONG SLEEVES and a BREATHING MASK.
4. Block the ladder securely.

INSULATING YOUR UNFINISHED BASEMENT

If you use your unfinished, unheated basement only for storage, you should consider putting insulation on the ceiling if there is none already. To do this relatively easy project, follow the instructions for insulating garage ceilings.

Insulating your basement walls is unnecessary unless you intend to convert the basement into a heated living space. In that case, you will most likely need a contractor since the job requires the installation of wall studs to hold the insulation — no easy feat. If you are thinking of finishing your basement in the near future, DO NOT insulate the ceiling.

If you decide not to insulate your unheated garage or basement ceiling, use rugs on the floors above these areas to provide added insulation in winter. It's a good idea to back up your rug with the best foam rubber pad you can afford; padding will increase the rug's R-value and also prolong its life. Then, in summer (all year round in the Sun Belt), you have the option of exchanging the rug for a lighter weight floor covering, which will help keep the room cooler.

INSULATING YOUR EXTERIOR WALLS

Insulating cold exterior walls is the most expensive option since the insulation must be blown in by a contractor. To determine if your wood frame walls have insulation, remove the electrical outlet box and use a flashlight to look around. You can use a plastic knitting needle to probe the wall cavity. **Be sure to shut off the electricity at the fuse box or circuit breaker first.**

If your present insulation has not deteriorated or settled too much, it may not be cost-effective to add more. In this section, you will find a number of suggestions for making the room side of exterior walls warmer without adding insulation inside the wall. Should you decide to opt for contractor-installed insulation, we have also included tips on how you can add a vapor barrier if it is needed.

Insulating Walls from the Room Side

1. Move chairs, sofas and beds away from cold walls and replace them with bookcases, wall units, breakfront cabinets or other high-standing furniture.
2. Hang an insulating curtain over a cold wall. (See Insulating Window Treatments.)
3. Use wall hangings, tapestries or carpets to insulate a cold wall.
4. Use mirrors on an exterior wall to reflect heat back to the room. Taping aluminum foil to the wall with aluminized duct tape is a less expensive way to get a reflective surface on a cold wall.
5. Add cork paneling to the wall.

Note: *When hanging material or placing a large object, such as a bookcase, on or near a wall, don't leave too large an air space behind it where warm, moist air can get in and out. Check periodically for moisture on the wall. If the wall is damp, you should move the hanging or furniture closer to the wall.*

Cutting Condensation from the Room Side

Generally, the insulation materials that contractors blow into your wall will not serve as a vapor barrier. To protect your new insulation and the inside of your walls from moisture:

1. Seal *all* openings that will allow moist air to enter your walls. (See the Caulking chapter for a list of caulking sites.)
2. Paint the room side of the insulated walls with two coats of paint with a *low vapor-permeability rating* ("perm rating"). A rating of 1 perm or less for primer and finish coat combined is desirable.

NOTES:

Recommended R-Values

I	R-26	R-11 to R-13*	R-11
II	R-26	R-11 to R-13*	R-13
III	R-30	R-11 to R-13*	R-19
IV	R-33	R-11 to R-13*	R-22
V	R-38	R-11 to R-13*	R-22

*R-value of full wall insulation, which is 3½" thick, will depend on material used.

R-Values Chart

	Fiber glass	Rock wool	Fiber glass	Rock wool	Cellulose fiber
R-11	3½"-4"	3"	5"	4"	3"
R-13	4"	4½"	6"	4½"	3½"
R-19	6"-6½"	5¼"	8"-9"	6"-7"	5"
R-22	6½"	6"	10"	7"-8"	6"
R-26	8"	8½"	12"	9"	7"-7½"
R-30	9½"-10"	9"	13"-14"	10"-11"	8"
R-33	11"	10"	15"	11"-12"	9"
R-38	12"-13"	10½"	17"-18"	13"-14"	10"-11"

NOTES:

NOTES:

MORE ENERGY SAVERS

Following are a number of additional steps you can take to make your home and lifestyle more energy-efficient without decreasing your comfort. Many of the tips offered here, such as using appliances wisely, will enable you to reap substantial energy savings at NO COST to you. While other measures (professional servicing of heating/cooling systems, etc.) require a cash outlay, this investment will be more than repaid by subsequent fuel savings.

THERMOSTATS — Dial UP or DOWN for Energy Savings

In winter, LOWER the thermostat to **65 degrees during the day** and **55-60 degrees** at night.

In summer and in the Sun Belt. RAISE the thermostat for air conditioning to **78 degrees.**

By lowering or raising your thermostat, you can save fuel and dollars and also slow down the rate of heat loss or gain. The greater the difference between the indoor and outdoor temperatures, the faster heat will be lost or gained by conduction.

Although the exact fuel savings will vary from region to region and depend upon your heating/cooling system, the more you lower or raise your thermostat the more fuel and dollars you are likely to save. As a rule, residents of colder climates can expect to realize the greatest dollar savings.

More important, you'll find that with some changes in clothing and bedding, turning the thermostat up or down can be done without loss of comfort. For example, if children kick off their covers at night, pin the blankets to the sheet or mattress with safety pins. Infants can sleep in a cozy flannel sleep sack or bunting. Additional tips on energy-wise clothing and bedding are presented at the end of this section.

Types of Thermostats — Automatic or Manual

If you wish a no-cost option, you can change the thermostat setting on your heating/cooling system by hand twice a day—at night and when you wake up in the morning. There are also a variety of devices on the market which will do it for you—either automatically or with some help from you. These devices range in cost from about $15 to $80, with automatic thermostats being more expensive.

Clock-type thermostats are the most convenient since they are fully automatic. They operate on a 24-hour clock that switches the temperature of your heating/cooling system twice a day at whatever times you have set on the timer.

The less expensive thermostats must be switched by hand either once or twice a day. Although you still have the task of remembering to change from day to night temperature, with these devices you need only flick a switch instead of resetting the dial each time.

Installing the Thermostat

If you are familiar with electrical wiring, you should be able to install a two-wire clock-type thermostat, once you have made sure that it operates on the same voltage as your present thermostat. If you don't know much about wiring, it's best to hire a professional.

Be sure that the thermostat is installed away from abnormally hot or cold areas, such as radiators, fireplaces, cold exterior walls, etc. If it is placed in the sun or in a drafty corner, you won't get a true reading of the room or house temperature.

HOT WATER SAVERS

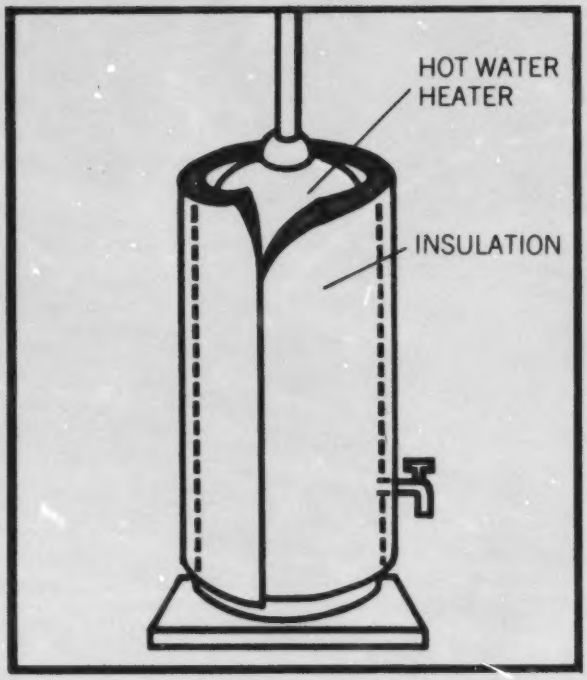
Water heating takes a big bite from your energy budget, accounting for about 15% of the energy consumed in the average home. Even when you're not running the hot water, your water heater is burning fuel just to keep the water hot. The higher the thermostat is set, the more fuel the heater burns for this purpose.

If you use a dishwasher, the thermostat on your water heater should be set at 140°. If not, 110°-120° is plenty. On some heaters, the settings may read HIGH, MEDIUM or LOW. Check with your service person or dealer to find out which of these settings corresponds to 140° or 120°. If you're buying a new dishwasher, choose one with its own heating element and keep your water heater temperature at 110°-120°.

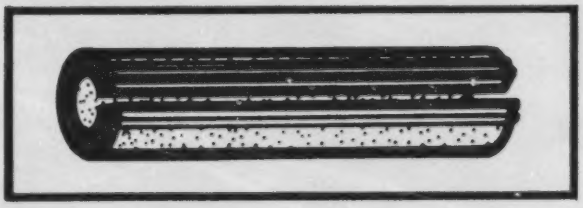
Insulating Your Water Heater

You should consider wrapping a blanket of fiberglass insulation around your water heater, especially if the water heater feels warm to the touch. Special kits for this purpose can be purchased at home improvement centers and many hardware stores. The drain plugs, temperature controls, face plate, and any vents at the top of the heater **should not be covered with insulation.**

It's also a good idea to insulate all exposed hot water pipes, especially pipes which pass through unheated areas such as basements and crawl



spaces. Don't forget the pipes between the water heater and the faucet. There are several kinds of easy-to-install pipe insulation available, including special cylindrical insulation which you just snap on around the pipe.



Other Ways to Keep Hot Water Fuel Dollars from Going Down the Drain

1. Have your water heater checked yearly to ensure that it's working efficiently.
2. Every few months, open the faucet at the base of the water heater and drain a bucket of water from the tank. This will remove sludge and mineral deposits that can reduce the heater's fuel efficiency and eventually corrode the bottom of the tank.
3. Install water flow restrictors in the shower head and faucets. These devices, which are available from plumbing supply houses and many hardware stores, reduce the flow of water without affecting your comfort. A low-flow shower head provides a good shower while cutting hot water consumption in half. Installing either of these devices is not too difficult to do.
4. Take showers instead of baths. On average, a five-minute shower uses 10 gallons of hot water, a bath 15 gallons.
5. REPAIR LEAKY FAUCETS: In one year a leaky faucet can send up to 6,000 gallons of hot water (and your hard-earned dollars) "down the drain."

HEATING/ COOLING SYSTEMS: Tune Them UP to Keep Fuel Costs DOWN

One of the best ways to ensure that you get the most from every fuel dollar is to keep your heating and cooling systems in top working order. If your furnace isn't burning fuel at its maximum efficiency or too much heat is being lost up the chimney, you end up using more energy than you should to heat your house. The same holds true for cooling costs. A dirty air conditioner filter or leaking refrigerant will reduce the efficiency of the cooling system and increase your energy consumption.

Heating Systems Check-Ups Once a Year

Your furnace and heat delivery system should be cleaned and adjusted by the service person before each heating season. (If you have an electric furnace, it may require less maintenance.) In between check-ups, there are a number of things you can do yourself to keep your heating system running smoothly.

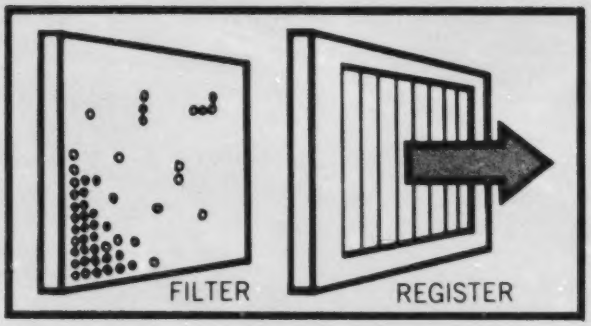
First, make sure that filters, blowers, vents, ducts, and radiators are kept clean and free from dust. Vents and radiators should not be blocked with furniture, drapes or other objects that will keep the heat from circulating to the room.

Place a sheet of aluminum foil or other reflective material behind the radiator; it will reflect heat back to the room.

Close vents and shut off radiators in unused rooms. Weatherstrip the doors and keep them closed so that these rooms don't rob heated air from the rest of the dwelling. **Caution:** *Be sure to ventilate the rooms regularly to prevent moisture build-up as well as possible freezing of any pipes in the walls.*

Air Heating Systems

If you have a forced-air heating system the air **filters** should be cleaned or replaced every 30 to 60 days during the heating season. Ask your service person to show you how; it's an easy job that's important to do.



You might also inquire about how to clean the fan blades that move air through the system. This **blower** should be cleaned out at least once a year or it will interfere with hot air flow.

Finally, vacuum or dust the **register** of your air heating sytem every few weeks so that dust and dirt don't build up.

Water Heating Systems

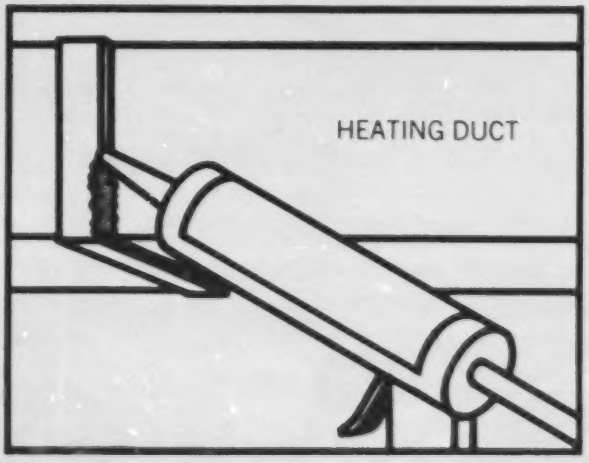
To improve the efficiency of a hot-water heating system, bleed the air from your **radiators** once or twice a year. Turn the air valve or the key on each radiator until water comes out. Hold a bucket under the valve and remember that the water is **hot**. Shut the valve tightly when the water stops spurting.

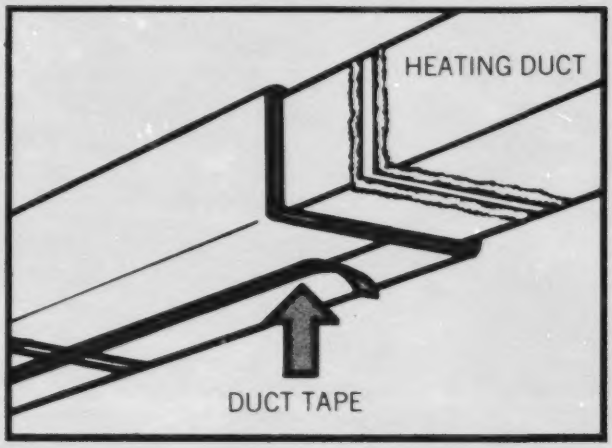
Steam Heating Systems

Every three weeks during the heating season drain a bucket of water out of your boiler. (Ask your service person to demonstrate.) This will prevent sediment from settling on the bottom of the boiler. By "insulating" the boiler from the burner flame, sediment can in rease the amount of fuel needed to heat the water and make steam.

Insulating Heating Ducts and Pipes

Exposed heating **pipes** and **ducts** that run through unheated spaces—attics, garages, crawl spaces—should be insulated. Duct insulation is available in 1"- or 2"-thick blankets. The thicker insulation is preferable, especially if you have rectangular ducts. Before insulating, seal the cracks between each section of ducting with caulk or duct tape. Keep the insulation foil facing outward, and seal the seams tightly with tape to avoid moisture build-up that will ruin the insulation.





For some tips on pipe insulation, see "Insulating Water Heaters".

Cooling Systems

Central Air Conditioning

Whole-house (central) air conditioning systems should be checked by a service person once a year. If your air conditioner uses the same ducts as your heating system, the **dampers** may have to be readjusted since different settings are usually required for heating and cooling.

In between check-ups, replace the air **filters** every 30 to 60 days and clean the **condenser coils** of dust and dirt. Ask your service person to show you how.

If the condenser unit is located outside your house it should be shaded; when it has to work in the sun, fuel is wasted. In shading the condenser, be careful not to obstruct the flow of air.

Make use of window and attic fans to reduce your air-conditioning load. Never run the fan at the same time as the air conditioner.

Room Air Conditioners

The filters on portable room air conditioners should be cleaned regularly. If problems develop, the unit should be repaired by a professional. When buying a room air conditioner, be sure to check the EER—Energy Efficiency Ratio. The higher the EER, the less electricity will be used to cool the same amount of air. You may find an Energy Guide Label instead of an EER on the unit. This label allows you to compare energy efficiencies and annual operating costs of all similar units.

Other Ways to Reduce Your Air-Conditioning Load

1. Watch your thermostat—if you have central air conditioning, you can save about 3% of your air conditioning bill for every degree you TURN UP the thermostat.
2. Whenever you can, use the *fan* setting on room air conditioners rather than the cooling setting.
3. Turn off lights during the day—most of the electricity they use makes HEAT, not light.
4. Don't use heat-generating appliances, such as dishwashers, during the hot part of the day.
5. Shade room air conditioners and make sure that drapes and furniture are not blocking the air flow.
6. Caulk the cracks between your room air conditioner and the window frame. Rope caulk is especially good for this job.
7. Close off unused rooms. If necessary, weatherstrip the doors or use a fabric draft stopper at the threshold. (See Weatherstripping chapter.)

FIREPLACES AND WOOD STOVES

More and more people are looking to fireplaces and wood-burning stoves as supplemental (and total) sources of heat.

Fireplaces

Logs crackling in the fireplace may be romantic, but don't expect them to yield much heat. The sad fact is that fireplaces—when used **in addition to** conventional heating systems—are big energy losers. Not only does 85% of the heat from your fire go right up the chimney, but your fireplace also robs the house of the air heated by your furnace.

If you do use your fireplace, keep the logs burning low and make sure to close the damper as soon as the fire is **completely** out. (Heat can escape through your fireplace even when no fire is burning!) For fireplaces without dampers, consider purchasing a glass fireplace enclosure; they're fairly expensive, but they'll prevent heat loss and are quite attractive.

Wood Stoves

Wood-burning stoves can help cut heating bills, but before buying one, **you must acquaint yourself with all the necessary precautions.** Improper installation, defective chimneys and inadequate maintenance—rather than faulty stoves—are the cause of most stove-related fires. Some states require permits for wood stoves and inspections once the stove is installed. Check with your local fire department.

If you already have a wood stove, be sure that you have:

- proper wall and floor protection;
- a fire extinguisher, smoke detector and metal ash holder.

APPLIANCES/LIGHTING

By using your appliances and lighting wisely, you can reduce energy consumption at no cost, WITHOUT reducing your comfort.

Appliances

Stoves and Ovens

1. Avoid preheating the oven; it's not necessary for foods that will cook for over an hour.
2. Check your gas stove's flame color; it should be blue. If the flame has traces of yellow, the burners may be clogged and need cleaning.
3. When cooking, use a broad flat pan that fits the burner. Keep pots and pans covered when heating.
4. Use a pressure cooker or crock pot when possible.
5. Use the burner rather than the oven when you can. This is a particularly good idea during the summer when you're trying to keep the kitchen cool.
6. When cooking, open the oven door as little as possible. You can lose up to 25% of the heat each time the door is opened. In winter, leave the oven door open when you've finished cooking to help heat the room.

Refrigerators/Freezers

1. Keep your refrigerator at 38°-40° F, your freezer at 5° F. Long-term freezers should be set at 0° F.
2. Defrost your freezer regularly. Never let frost get thicker than ¼ inch.
3. Make sure that the refrigerator door is sealed tightly. When the door is shut, you should have difficulty pulling a piece of paper through. An old refrigerator door can be sealed with plastic V-type weatherstripping.
4. Don't open the refrigerator door unless it's necessary.
5. Cool foods before placing them in the refrigerator; hot foods will cause the refrigerator to turn on its cooling mechanism.

6. When buying a new refrigerator, consider one with a "power saver switch." It lets you turn off the internal heating device that prevents refrigerators from sweating. Some old refrigerators feature this device. Also remember that a "frost-free" refrigerator uses much more energy than one that needs manual defrosting.

Dishwashers and Laundry Appliances

1. Use dishwashers, clothes washers and dryers only when they are *full*.
2. Don't use the "rinse hold" or "pot scrubber" cycle on your dishwasher. Use cold water to rinse dishes. Let your dishes air dry.
3. Use cold water for washing, and don't add too much detergent. Whenever possible, dry clothes outside on a clothes line.

Lighting

1. Where lights are not necessary, TURN THEM OFF.
2. Use fluorescent bulbs wherever possible. A 25-watt fluorescent bulb gives off as much light as a 100-watt incandescent one.
3. Clean light fixtures regularly.
4. Eliminate some of the need for artificial lighting during the day by placing desks and reading chairs near windows.

CLOTHING AND BEDDING: Keeping Comfortable While Saving Energy

If you maximize your "body insulation" you need not sacrifice comfort when you turn the thermostat down or up. While we humans do maintain a constant body temperature, compared to other members of the animal kingdom, our bodies are not very well insulated. Lacking fur or feathers, we lose or gain body heat rather quickly upon contact with cold or hot air. Happily, this absence of natural insulation can be easily rectified by a wise choice of clothing.

Keeping Warm

Layering

By wearing several thin layers of clothing rather than one heavy layer, you trap air—one of the best insulators—between the layers and keep your body warmer. Layered clothing also gives you the advantage of being able to adapt readily to changes in temperature, since you can remove layers as the thermometer goes up.

Nightcaps and socks

Your body loses heat most quickly through the head, hands and feet. At night, a nightcap and socks can go a long way toward making you warmer when the thermostat's turned low. Longjohns help too! During the day or evening, wear extra sweaters or wrap yourself in a cozy quilted sack. Instructions for this easy-to-sew project are presented at the end of this section.

Keeping Cool

If your first inclination is to shed clothes when the thermometer climbs, you might do well to consider how the denizens of very hot climates dress. The flowing robes, caftans and burnooses favored by desert peoples around the world keep them cool in several ways: not only do these garments shade the wearer from the sun, they also allow air to circulate freely underneath which evaporates perspiration and cools the body.

Loose-fitting clothes made of natural fibers—cotton, linen or even wool—which are both porous and absorbent can actually keep you cooler than tight-fitting shorts or T-shirts.

Bedding

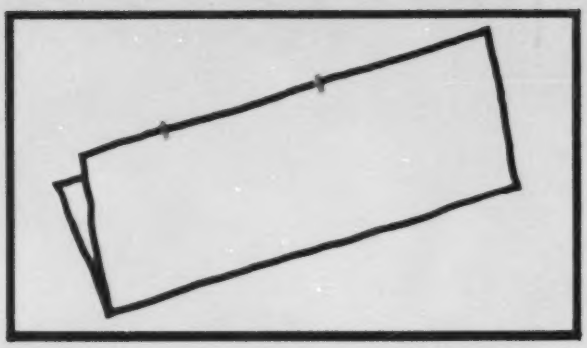
As with clothing, layered bedding works best. Several light blankets will keep you warmer than one heavy blanket or quilt. If you can afford one, a down comforter is an excellent insulator because it traps many layers of air. Just think of what down does for the goose! The less expensive wool and synthetic comforters, of course, are more than adequate for the nighttime temperatures we recommend. Using an electric blanket is more energy-efficient than heating up the whole bedroom with a space heater. In very cold regions, flannel bedsheets are a good investment. And remember to keep your bed away from windows and cold exterior walls.

A Quilted Sack

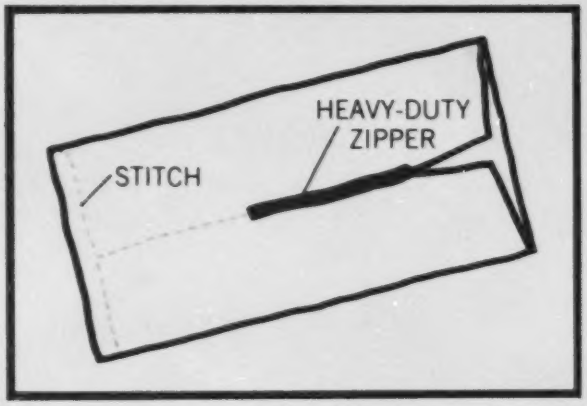
This "body sack", based on a design from *The Mother Earth News*, will keep you comfortable while you're reading, watching television or just relaxing. The sack is easy to make; all it requires are an old quilt or comforter and some very basic sewing skills.

The quilt or comforter may be used as is, which avoids having to cut and hem the material, or it may be cut to size. For a custom-sized bag, measure the person from shoulders to feet and add about a foot to allow extra room for sitting. The width of the material should be approximately 60 inches.

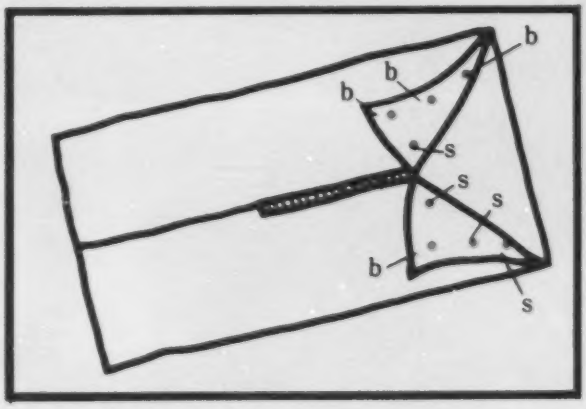
1. Fold the quilt in half lengthwise, right sides together. Make two marks along one side—one 16" from the bottom, and the second 30" from the first mark.



2. Pin long edges together. Stitch a 3/4" seam from the bottom to the first mark. Baste to the second mark.
3. Install the zipper between the first and second marks, using a centered application.



4. Lay the quilt flat on the floor, and position it so that the seam is in the center. Pin the bottom edges together and stitch closed.
5. Turn the sack right side out.
6. Attach 6 snaps along the top inside edges and two more just above the zipper on the inside edges. Use the illustration as a guide for ball and socket placement of the snaps.



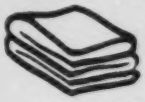
Note: *A pattern for a "Warm Sack" that can be made from any quilted fabric is available from Coats & Clark, Inc., Consumer and Educational Affairs Department, 72 Cummings Point Road, Stamford, CT 06902.*

Materials

heavy-duty thread

4 sets of gripper or

sew-on snaps, size 3 or 4;



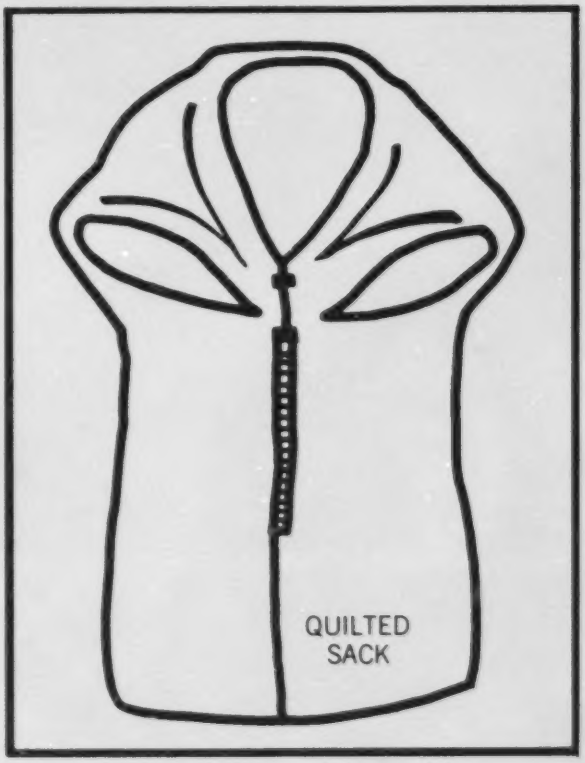
old quilt or comforter;

30" heavy-duty zipper

Tools

sewing machine heavy-duty needle (can also be sewn by hand)

tailor's chalk



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MORE ENERGY SAVERS

Choosing A Contractor

If you decide that a particular home energy improvement should be done by a contractor, here are some things to consider when looking for the right person for the job:

Where to start looking

Get recommendations. Ask friends, neighbors and co-workers for the names of good contractors. Gather as much information as you can about each contractor's reliability and the quality of his/her work.

The local chapter of the National Association of Home Builders or the Home Builders Association is very helpful in recommending contractors.

Your banker will recommend a good contractor if he or she is lending you the money to do the work.

From these sources, make up a list of three or four contractors.

How to narrow your list

Ask each contractor for the names of past customers. Call them and ask if they were satisfied with the work. If the customer is willing, you might visit his or her house for a first-hand appraisal.

See how long each contractor has been in business —generally, the longer the better.

Call your local Better Business Bureau and ask if any complaints have been lodged against the contractors on your list.

Get an estimate from each contractor on any job you think will cost more than $200.

Signing the contract

Have the contractor write up a specific contract for your job. Read it over carefully and sign it only when you are fully satisfied that it includes everything you want done. Plans, specifications and the time period in which the job will be completed should be spelled out.

CONTRACTORS / NOTES:

99

FINANCING HOME ENERGY IMPROVEMENTS

The federal government provides tax incentives and low-interest loans to encourage energy conservation and the development of alternative energy sources. There are also a number of federally funded programs to help low-income families and the elderly cope with rising fuel costs.

ENERGY TAX CREDITS

Unlike tax deductions, every dollar of a tax credit saves a dollar of federal taxes, regardless of your tax bracket.

Insulation and Conservation Credit

Homeowners and renters* are eligible for a tax credit of up to $300 (15% of the first $2,000 spent) for making a variety of conservation improvements to their "principal" residences from April 20, 1977 to December 31, 1986.

Among the improvements covered are:

- ceiling, wall and floor insulation
- caulking and weatherstripping
- storm or thermal windows and doors
- automatic energy-saving thermostats
- furnace modifications to improve fuel efficiency

Renewable Energy Source Credit

Homeowners and renters* who buy and install solar, geothermal, or wind-powered equipment for heating and cooling, hot water and electricity generation are eligible for a tax credit of up to $4,000 (40% of the first $10,000 spent).

* Stockholders of cooperative housing corporations and owners of condominiums may claim a credit based on their share of the cost of the qualifying items.

SOLAR AND CONSERVATION BANK

Congress has passed legislation creating a Solar and Conservation Bank, and regulations are now being drafted that will provide subsidies to residents and businesses who take out loans to buy qualifying energy-saving and solar devices. Because funding is limited, the bank subsidies will probably be available primarily for passive solar applications and to low-income families for conservation and solar.

LOANS

Many federal departments and agencies offer loans or loan guarantees for energy conservation home improvements:

Housing and Urban Development (HUD)*

1. **Section 312 loans:** Federal loans of up to $27,000 at 3% interest for 20 years are available for home rehabilitation. The costs of insulation, storm doors and windows, heat pumps, solar installations, and other conservation items can be financed by these loans. Priority is given to low- and moderate-income applicants in urban renewal areas.

For other requirements and information: contact Office of Urban Rehabilitation & Community Reinvestment, Room 7170, HUD, 451 7th Street, SW, Washington, DC 20410.

2. **Loan insurance for multi-family dwellings:** Government loan insurance is now available on loans for the installation of energy-saving and solar systems or individual electric metering. The insurance should make it easier for multi-family property owners to finance these improvements. Contact: Office of Housing, Room 9220, HUD, 451 7th Street, SW, Washington, DC 20410.

*At press time, the availability of these funds is uncertain. You may want to consider a community development block grant (see page 61).

The Veterans Administration (VA)

Loans from the VA's direct and guaranteed home loan program can be used to finance a range of conservation improvements, such as insulation, weatherstripping, caulking, storm windows and doors, and furnace modifications. Contact: Loan Guarantee Service, Dept. of Veterans Benefits, Washington, DC 20420.

Farmers Home Administration (FmHA)

FmHA county offices will give home improvement repair loans of up to $7,500 with a 1% interest rate. Full grants of up to $5,000 are available to persons 62 years or older if they do not have the ability to repay. Contact: FmHA, US Department of Agriculture, Room 5345, South Agriculture Building, Washington, DC 20250.

Tennessee Valley Authority (TVA)

(Tennessee, Virginia, North Carolina, Alabama, Georgia, Kentucky, Mississippi)

TVA customers who heat electrically are eligible for interest-free loans of up to $2,000 (7 years repayment) for attic and floor insulation, storm windows, weatherstripping and caulking. For customers who only cool electrically, loans do not cover floor insulation or storm windows.

TVA also offers a free home energy survey to any residential customer who requests one.

RESIDENTIAL CONSERVATION SERVICE

Beginning in the 1980-81 heating season, most electric and gas utilities are required by the US National Energy Act to inform you of potential conservation and solar improvements to your home and to provide you with cost estimates. Utilities can charge no more than $15 for an on-site energy audit and in some states will provide this service for free.

Utilities must also give you a list of lenders, suppliers and contractors, and even offer to arrange for installation and financing. Your utility may itself make loans for conservation measures, such as storm windows, insulation, wind systems, and passive solar improvements, which you repay with the monthly gas or electric bill. For more information contact your utility or write to: Building Services Division, Conservation and Renewable Energy Dept., Department of Energy, Mail Stop 6-B025, Forrestal Building, 1000 Independence Avenue, SW, Washington, DC 20585.

EMERGENCY AID

There are a number of federal and state programs which provide low-income and elderly persons with financial and technical assistance to insulate their homes and to help defray rising fuel costs. As a rule, federal and state funds are administered through local community action programs (CAPs).

Weatherization Assistance Program — Department of Energy

Low-income households, especially the elderly and the handicapped are eligible to receive weatherization assistance under this DOE program, which provides a maximum grant of $800 per dwelling to make home repairs and other energy-saving improvements.

A low-income household is one whose combined income falls below 125% of federal income poverty guidelines, or receives certain federal, state and local assistance payments. The state or local agency (usually a CAP) determines which eligible homes are to be weatherized.

For further information, write Weatherization Assistance Program, Office of State Programs, DOE, 1000 Independence Avenue, SW, Washington, DC 20585.

Low-Income Energy Assistance Program — Department of Health and Human Services, formerly HEW

This program enables states to provide financial assistance to eligible low-income households to help them pay their fuel bills. Payments are made either directly to the household or to the fuel supplier. In the case of tenants in public or subsidized housing, payment may be made to the building operator. The amount depends on household income and energy costs, climate, and the presence of an elderly or handicapped person in the household. Eligible households are those with incomes below federal guidelines, as well as those with at least one person eligible for Aid to Families with Dependent Children, Supplemental Security Income, Food Stamps and certain Veterans Administration benefits.

While no payments may be made under this program for repairs or home weatherization improvements, households must be referred to other agencies for these services. The program will be administered by the Social Security, the state Department of Social Services or local CAPs. The state is required to publicize the program and make every effort to reach and serve those eligible for assistance.

COMMUNITY DEVELOPMENT BLOCK GRANTS — HUD

Grants are made available through the local governments of cities over 50,000 to help low- and moderate-income persons make home improvements, including weatherizing their homes. Smaller communities must apply to HUD regional offices for grants. For information, contact your mayor's office or Entitlement Cities Division, Community Planning & Development, Room 7282, HUD, 451 7th Street, SW, Washington, DC 20410.

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BRINGING ENERGY CONSCIOUSNESS TO THE COMMUNITY: BRANCHING OUT

In this section, you'll find a variety of ways to help others benefit from your experience in saving energy and saving money. All of the ideas presented here have been tried with great success by individuals and community groups around the country. Most of the projects were done on a shoestring, taking advantage of the volunteer time, technical help, materials, and support of local civic groups, schools and businesses.

Since we can't possibly cover the whole range of innovative ways to reach out to the community, we've included a list of additional resources which we think will prove helpful.

REACHING OUT AND PLUGGING IN

No matter where you live, it's likely that a network of community organizations already exists — block associations, women's groups, garden clubs, churches, etc. Faced with ever-rising fuel costs and shortages of supply, chances are that many of these groups have already begun to address the energy question in some way. If there are ongoing energy programs in your community, it's here you may wish to plug in. If such programs don't exist, perhaps with a little nudge from you they'll get a start.

REACH OUT TO*

Solar and environmental organizations
Youth groups
Neighborhood associations
Religious organizations
YMCA/YWCA, PTAs, school boards
Libraries
Community colleges
Adult education programs
Special interest groups—low-income, senior citizens, labor, consumers, minorities, taxpayers
Elected officials, public servants
Community service groups—Elks, Lions, Optimists, Rotarians, Junior League, Assistance League, League of Women Voters
Women's groups—American Association of University Women, National Organization for Women, Associated Women's Clubs
Business associations
Chambers of Commerce
Utilities

**Reaching Up, Reaching Out,* p. 71.

SOME IDEAS FOR RAISING ENERGY CONSCIOUSNESS

While the following projects differ in the amount of time, effort and organizational back-up required to carry them out, most can be adapted to meet the special needs and resources of you and your community.

Conduct A Home Weatherization Workshop

Six volunteers from the Colorado Solar Energy Association did it. Their 4-session hands-on workshop took about five months to plan. Workshop participants first learned how to do a home energy audit and tried out various insulating materials and techniques. Then the workshop was split into teams of 5 to 10 people. With the help of instructors, the teams weatherized nine low-income homes using materials donated by local merchants and manufacturers. A final session was devoted to a lecture and tour of two well-designed passive solar buildings.

As part of the follow-up the workshop planners prepared an excellent guide on "how they did it":

"Saving Home Energy: A Handbook for Organizing a Hands-On Energy Conservation Workshop" is available from CSEA, PO Box 5272, Denver, CO 80217 for $3.95, plus $.75 for shipping and handling.

Start small

If you don't have the time or organizational back-up for such an ambitious project, get a few friends together and plan a series of home weatherizing days. In the spirit of a frontier house-raising, you can all make the rounds until everyone's home is done.

Organize an ENERGYFAST

Convince members of your community to agree to: (1) give up driving their cars one day a week; (2) reduce energy use in their homes or businesses by 20%; and (3) educate at least two other people to do the same.

Creative Initiative, a non-profit research and educational foundation in Palo Alto, California, tried it with great results. CI volunteers visited over 12,000 households and got 78% to participate in ENERGYFAST. CI also established a local "Youth Conservation Corps" in which high school students educate and encourage their families to improve their energy use.

For information on ENERGYFAST and the Youth Conservation Corps, contact Paul Valentine, Creative Initiative, 222 High Street, Palo Alto, CA 94301.

Start small

Try your block or apartment building first, or your department at work.

Hold an Energy-Conscious Fashion Show

The League of Women Voters in Santa Fe, New Mexico, hosted one as part of an overall energy awareness campaign. Their "Dress Up—Dial Down" fashion show/luncheon demonstrated how, by layering clothing and choosing fabrics and accessories wisely, women and their families could stay warm with the thermostat low.

Other possible themes: (1) alternatives to long-distance energy-consuming vacations; (2) energy-conserving cooking; (3) energy-conscious design and interior decorating.

Make Your Apartment Building More Energy-Efficient

The tenants of a 150-unit New York City cooperative are doing just that. With the help of a local school of architecture and a licensed engineer, the residents of 1 Gracie Terrace have begun a systematic program to incorporate energy conservation measures in their building. Some of the steps, such as reducing the hot water temperature and using cold water in 66% of the building's washing machines, cost nothing yet will yield up to $2.500 in savings a year. Other measures — e.g., heat control valves on radiators and fluorescent lighting in public areas — require a capital outlay, but are expected to pay for themselves in five years.

For more information, contact Gracie Terrace Apartment Corporation, 1 Gracie Terrace, New York, NY 10028.

Encourage Adult Education Courses in Energy-Saving Skills

Local community colleges or high school adult education programs can be an excellent tool for energy education. That's what Bonnie Howe of the People's Organization for Energy Resources (POWER) in Aberdeen, Washington, found. As part of POWER's effort to help low-income and senior citizens help themselves, Howe organized a free six-session course, co-sponsored by the Grace Harbor Community College. A carpenter taught how to make the simple plumbing and home repairs needed for an energy-conserving home. The participants, including many senior citizens and women who headed households, received two college credits while learning energy and money-saving skills.

A set of guidelines for running a conservation course is available from Paul Youmans, Director, Grace Harbor Community College, 207 S. Chehalis, Aberdeen, WA 98520.

Start a Weatherization or Fuel Cooperative

In many communities across the United States people are saving money by buying insulation and fuel in bulk.

- The Creduco insulation cooperative in Ann Arbor, Michigan, buys insulation wholesale and encourages members to install it themselves. Estimated savings: up to 40%.
- Because one-half of the people in Harris County, Georgia, use wood stoves for heating, the West Georgia Farmers Coop added a wood-buying service. Now, members and non-members alike can buy stove wood at a big discount.
- The Association of Neighborhood Housing Developers (ANHD), a non-profit group in New York City, buys heating oil for 23 apartment buildings at a yearly savings of $50,000, or $100 to $150 per apartment.

Since quite a bit of capital is required to get a cooperative going, it may make sense to approach an existing coop or credit union in your community about taking on insulation or fuel buying as one of its member services.

For information on how to set up a buying coop, contact Stewart Kohl, North American Students of Cooperation, Box 7293, Ann Ar-

bor, MI 48107. Also the Cooperative League of the USA, 1828 L Street NW, Washington, DC 20036. "Cheaper by the Million," a how-to booklet, is available from ANHD, 115 East 23rd Street, New York, NY 10010 for $3.00 postpaid.

Start small

Get a group of neighbors to "weatherize" together and negotiate with local merchants and/or contractors for reduced rates on materials and services.

FOUR WAYS TO TEACH THE CHILDREN

Children's Library Hour

The New Mexico Solar Energy Association convinced a local library to hold a children's conservation/solar energy program during a regularly scheduled children's library hour. Through experiments, films, songs and discussion the children were introduced to energy principles in a most enjoyable way.

Getting Energy into the Curriculum

Although many free or low-cost materials on energy conservation are currently available, not all schools have taken advantage of them. The National Council of Jewish Women of Stamford, Connecticut is trying to do something about it. NCJW is working with local teachers to find out what information exists, and circulating petitions calling upon the public schools to adopt an energy unit within the science curriculum.

Cutting School Energy Costs

To cut down on gas and electricity use, a New Orleans school district offered students 50% of the energy dollars saved during the 1978 school year. The kids were given the choice of spending the money on school equipment, supplies, repair or renovation. Student governments of 88 schools are now reaping the rewards of the $300,000 saved. What better way to teach the lesson that saving energy means saving dollars?

For further information, contact Sam Scarnetto, Deputy Superintendent, 4100 Touro Street, New Orleans, LA 70122.

Children's Traveling Show

The Lollipop Players, three talented women in Connecticut, have put together a traveling energy conservation show for children. Using pantomime and songs they teach the children valuable lessons in energy conservation. During the year the show is presented to eager audiences in schools, community fairs and other local events.

HELP ORGANIZE AN ENERGY FAIR

Towns and cities from Alaska to Florida have been the sites of all-day energy fairs. In Brevard, Florida, the Florida Regional Energy Action Committee sponsored a free "Energy Awareness Day" which featured a host of energy exhibits, speakers and entertainment. The event provided the community with practical information on energy use, conservation and alternatives.

The Women's Energy Outlet, a day-long energy fair sponsored by Consumer Action Now and a coalition of community groups, attracted thousands of residents in Stamford, Connecticut. They viewed conservation and solar exhibits and participated in workshops and demonstrations ranging from weatherizing techniques to a Car Care Clinic for women.

Planning, organizing and publicizing events such as these require lots of time, energy and just plain hard work. Yet those who have tried it will be quick to agree that the pay-off is great. Furthermore, there are many excellent guides which give step-by-step "how-to's" on getting such events off the ground.

Here's one: "So You Want to Have an Energy Fair", from the Center for Renewable Resources, 1001 Connecticut Avenue, NW, Washington, DC 20036. See our Resource List for others.

Start small

If you're not up to organizing a full-scale energy fair, why not do an energy exhibit for an already planned event—like a garden show, street fair, or bazaar.

SOME ADDITIONAL RESOURCES

Reaching Up, Reaching Out: A Guide to Organizing Local Solar Events. Solar Energy Research Institute. Order from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 (stock #061-000-00345-2). $8.50.

A must! Includes: (1) 15 case studies of successful solar and energy conservation activities (some borrowed for this section); (2) an organizing primer on what to do before, during and after an event, including tips on fund-raising, publicity, speakers; (3) an annotated bibliography on 11 energy topics.

The Grass Roots Fundraising Book. Joan Flanagan, Swallow Press, Chicago, IL, 1977. $5.25.

How to raise funds and organize special events.

"Some Organizing Strategies that Are Doable — More or Less". Ken Bossong, Citizens' Energy Project, 1110 6th Street, NW, #300, Washington, DC 20001. 1978. $2.50.

Low-cost ways for groups to exchange information and put on events.

"The Energy Consumer". U.S. Department of Energy, Office of Consumer Affairs, Washington, DC 20585. Free.

News of federal energy programs and citizen self-help projects around the U.S. It is the source of a number of the projects described in this section.

"Getting into Print". League of Women Voters, 1730 M Street, NW, Washington, DC 20036. 1974. 25¢.

How to get publicity, write press releases, hold press conferences.

"Community Guide". League of Women Voters. 50¢.

Ways to bring diverse citizen groups together on energy issues.

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CAREER OPPORTUNITIES IN THE ENERGY FIELD

A study prepared for the Joint Economic Committee of Congress in 1979 estimates that if the country chooses a solar and conservation path instead of relying on conventional fuels, we will net as many as 2,000,000 jobs by the year 2000!

In towns and cities across the country, women are already beginning to take advantage of the growing job and business opportunities in the energy field.

- In Rochester, New York, a secretary thought she would earn some extra money by weatherstripping neighbors' windows in her spare time. She is now devoting full time to her thriving weatherization business.
- In San Francisco, California, a woman is co-owner of a successful solar sales and contracting business; the company's installation crew is also headed by a woman.
- In New Haven, Connecticut, a former social worker is studying solar design, heat-loss calculation and plumbing at a local technical school. It'll be another year before she completes the two-year program, but she's already had two job offers!
- In Golden, Colorado, a woman who volunteered for a citizen group that promotes conservation and solar energy is now a paid organizer for a major energy education and research institute.

During the next two decades, there will be a wide range of jobs opening up, from well-paying blue-collar positions to professional and management jobs. Because the energy field is so new, women have an excellent chance to get in on the ground floor.

- Jobs in conservation—energy auditors, insulating contractors, carpenters, cement masons, electricians and plumbers.
- Jobs in solar—construction, sales, installation, semi-skilled manufacturing and maintenance.
- Jobs for architects and engineers; planners and economists; scientists and lawyers.
- Jobs in industry, government and politics.
- For women entrepreneurs, solar and conservation businesses.

RESOURCES

Traditional and Non-Traditional Careers

Affirmative Action Register. An employment catalogue listing job opportunities for minority, female and handicapped professionals. Your local library or women's career center may have a copy.

Blue-Collar Jobs for Women: A Complete Guide to Getting Skilled and Getting a High-Paying Job in the Trades. Murial Lederer. Sunrise Books, E.P. Dutton, New York, 1979.

I Can Be Anything: Career and Colleges for Young Women. Joyce Slayton Mitchell. Bantam Books, Inc., New York, 1978.

"National Directory of Women's Employment Programs." Women's Work Force, Wider Opportunities for Women, Inc., 1649 K Street, NW, Washington, DC 20006. $7.50.

Community Jobs. A newspaper with information on social change oriented careers. 1704 R Street, Washington, DC 20009, (10 issues, 48.88 per year).

"Women in Non-Traditional Jobs: Information and Resources." Wider Opportunities for Women, Inc., 1649 K Street, NW, Washington, DC 20006. $1.00.

"Women in the Sciences." Constance Carter. Research Section, Science and Technical Division, Library of Congress, Washington, DC 20540. Free.

Education and Training

National Solar Energy Directory. Superintendent of Documents, U.S. Printing Office, Washington, DC 20402. (stock # 061-000-00368-1) $5.50. (A *State Solar Energy Education Directory* for your state is available free from the National Solar Heating and Cooling Information Center by calling 800-523-2929, in Pennsylvania 800-462-4983.) This directory provides a complete national listing of the thousands of schools across the country offering training in every aspect of solar use and environmental control.

"Selected List of Educational Opportunities for Minorities and Women." Carol Hobson Smith. Department of Health, Education and Welfare, 400 Maryland Avenue, SW, Washington, DC 20202. Free.

The Solar Jobs Book. Katherine Ericson. Brickhouse Publishing Company, Massachusetts, 1980.

The following schools and organizations provide women with training and counseling in non-traditional fields, such as carpentry, plumbing, energy-efficient construction, etc. Some provide a placement service as well. Write to them directly for more information.

Cornerstones
54 Cumberland Street
Brunswick, ME 04011

Women's Enterprises of Boston
755 Boylston Street
Boston, MA 02116

All-Craft
19-23 St. Marks Place
New York, NY 10003

National Urban League, Inc.
600 East 62nd Street
New York, NY 10021

Recruitment and Training Program (R.T.P.)
162 Fifth Avenue
New York, NY 10010

Wider Opportunities for Women
1649 K Street, NW
Washington, DC 20006

WAGES (Women's and Girls' Employment Enabling Service)
202 Union Avenue
Memphis, TN 38103

Creative Employment Project—YWCA
608 South 3rd Street
Louisville, KY 40202

Comprehensive Vocational Program for Women
Brevard Community College
Clearlake Road
Cocoa, FL 32922

National Congress of Neighborhood Women
11-29 Catherine Street
Brooklyn, NY 11211

Skilled Jobs for Women
111 South Hamilton Street
Madison, WI 53703

Georgia Solar Coalition, Inc.
3110 Maple Drive
Suite 403-A
Atlanta, GA 30305

Better Jobs for Women
1038 Bannock Street
Denver, CO 80204

Women in Apprenticeship Program
25 Taylor Street
San Francisco, CA 94102

Non-Traditional Job Opportunities
Lower Columbia College
1600 Maple
Longview, WA 98632

Financing Your Education

In addition to government aid programs for students, such as the National Direct Student Loan and Guaranteed Student Loan Program,* there are a number of private loans and grants earmarked *especially for women.*

The Business and Professional Women's Foundation administers four scholarship programs for job-related continuing education for mature women. Available to women over 25 who are pursuing full- or part-time study in an accredited university, college or trade school program.

Contact: BPW Foundation
2012 Massachusetts Avenue, NW
Washington, DC 20036

General Federation of Women's Clubs awards scholarships to women through its local and state chapters. For the address of the Women's Club office in your state,

Contact: GFWC
1734 N Street, NW
Washington, DC 20036

Soroptimist Training Program aids women in re-training, entry or re-entry into the job market. Awards of $1,250 are granted by region.

Contact: Soroptimist
1616 Walnut Street
Philadelphia, PA 19103

Society of Women Engineers administers 12 annual scholarships to women majoring in engineering. Awards range from $200 to $1750.

Contact: Society of Women Engineers
United Engineering Center
345 East 47th Street
New York, NY 10017

The Business and Professional Women's Foundation Fund for Women in Engineering has loaned over $100,000 to women engineering students. Maximum loan is $10,000 repayable over a 5-year period at 5% interest, beginning one year after graduation.

Contact: BPW Foundation
Engineering Loan Program
2012 Massachusetts Avenue, NW
Washington, DC 20036

*For information contact any local bank.

Publications

"Educational and Financial Aid Sources for Women." Clairol, Inc., Loving Care Scholarship Program, 345 Park Avenue, New York, NY 10022. Free.

"Educational Financial Aids." American Association of University Women, Sales Office, 2401 Virginia Avenue, NW, Washington, DC 20037. $1.00.

"Financial Aid, A Partial List of Resources for Women." Project on the Status of Education of Women, 1818 R Street, NW, Washington, DC 20009. Free.

"Financial Aid: Where To Get It, How To Use It." The Business and Professional Women's Foundation, 2012 Massachusetts Avenue, NW, Washing-

ton, DC 20036. $1.00.

"Financial Assistance for Education: Bibliography and Resources." Catalyst, 14 East 60th Street, New York, NY 10022. $5.00.

"Need a Lift?" The American Legion, PO Box 1055, Indianapolis, IN 46202. $.50. (Scholarship and loan information, including state-by-state table of educational benefits.)

Financing Your Energy Business

U.S. Small Business Administration Solar Energy and Energy Conservation Loan Program. The SBA gives loans and loan guarantees, awards training grants, and offers seminars to business people entering the energy field. Loans of up to $350,000 are available to small businesses that are developing, manufacturing, selling, installing or servicing specific solar and conservation measures (including insulation procedures). For more information, contact your local SBA office or write Evelyn Cherry, Special Projects Director, U.S. Small Business Administration, 1441 L Street, NW, Washington, DC 20416.

AT Business Packet. The National Center for Appropriate Technology, PO Box 3838, Butte, MT 59701. $6.50. Includes information on the economics of starting an "appropriate technology" business; financing and investment capital opportunities; and an annotated bibliography on small business organization and operation.

Starting Your Own Energy Business. Institute for Local Self-Reliance, 1717 18th Street, NW, Washington, DC 20009. $4.00.

The *American Women's Economic Development Corporation* provides management training, technical assistance and counseling for women entrepreneurs. 1270 Avenue of the Americas, New York, NY 10020.

The National Solar Heating and Cooling Information Center will give you free lists of manufacturers in any three states. (800) 523-2929.

For additional information on jobs, education and business opportunities contact:

American Women's Economic Development Corporation
1270 Avenue of the Americas
New York, NY 10020

Association for Women in Science
1346 Connecticut Avenue, NW
Suite 1122
Washington, DC 20036

Business and Professional Women's Foundation
2012 Massachusetts Avenue, NW
Washington, DC 20036

League of Women Voters Energy Education Fund
1730 M Street, NW
Washington, DC 20036

National Council of Career Women
Suite 818, National Press Building
Washington, DC 20036

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Appliance Labeling Program—A system of rating the energy-efficiency of major household appliances. An *Energy Guide* label attached to the appliance allows the shopper to compare its efficiency and estimated annual operating costs with those of similar appliances.

BEPS (Building Energy Performance Standards)—A nationwide building code proposed by the Department of Energy (DOE) that will establish standards for energy efficiency in all new buildings.

BTU (British Thermal Unit)—The amount of heat energy required to raise the temperature of one pound of water one degree Fahrenheit.
burning a match = 1 BTU
1 gallon fuel = 144,000 BTU's

caulking—Flexible material used to seal joints or cracks around the home and stop air infiltration.

conduction—Process of heat transfer in which heat moves directly through a material. Windows lose heat *through* the glass by conduction.

convection—Heat transfer created by the motion of air, resulting from temperature or density differences. An example is hot air rising and cold air falling.

cost-effective—Refers to the cost of a treatment compared with the yearly savings and the time required to get back the initial investment.

countersink—To sink the heads of screws, nails or bolts flush with or slightly below the surface of the wood.

cross bracing—Two pieces of wood nailed between adjacent joists, forming an X, installed to hold the joists in alignment and help distribute floor loads.

degree days—A unit to calculate the heating/cooling requirements of a building. It is the average temperature difference relative to 65° for a given day. If the average outside temperature over 24 hours is 30°F., the degree days would be 35. The total number of degree days during the heating season is a measure of the relative severity of the winter in an area.

eaves—Projecting overhang at the lower edge of a roof.

EER (Energy Efficiency Rating)—A number given to rate the efficiency of many appliances including air conditioners. The higher the number the less electricity the unit will use to do the same job as another unit with a lower number. The EER system is gradually being replaced by the Appliance Labeling Program.

energy audit/survey—Detailed inspection of a home to rate its energy efficiency, identify areas of heat loss, and recommend energy conservation measures.

glazing—The layer (or layers) of glass or plastic in a window. Windows with two layers of glass (double glazing) and an air space in between lose half as much heat as single-glazed windows.

heat flow—The movement of heat energy from hot to cold objects by conduction, convection or radiation.

humidity—The amount of water vapor (moisture) in the air. You feel warmer in winter if there is more humidity in a room because it slows down evaporation, which is a cooling process. Excess humidity makes you feel hot and sticky in the summer for the same reason.

infiltration—Uncontrolled flow of air into a dwelling through its cracks, leaks and other openings because of wind pressure, temperature difference, etc.

insulation—Any material which is *not* a good conductor of heat energy. The better a material resists heat transmission, the higher its R-value.

joist—Any of the parallel horizontal beams used to support the boards of a floor or ceiling.

kilowatt—1,000 watts of electrical power. You pay for your electricity by the kilowatt hour (kWh), which measures your actual consumption; a kWh equals about 3,400 BTU's.

miter—To cut at any angle other than 90°.

non-renewable resources—Sources of energy in limited supply such as fossil fuels (oil, coal, natural gas) and uranium.

payback period—The time needed to recover the investment on a conservation measure, solar system, etc., through the resulting savings on fuel.

peak rates/off-peak rates—Electrical pricing based on not only the volume of electricity used by the public but also on the time of day and the season when the electricity is used. Under this system utilities offer lower rates during off-peak periods to encourage customers to use power when there is less demand on the grid.

perm rating—A measure of the vapor permeability of paint. The lower the perm rating, the more effective the paint is as a vapor barrier.

radiant energy—Energy in the form of infrared rays that travel through space and warm an object without physical contact. The sun is our greatest source of radiant energy.

renewable resources—Sources of energy in unlimited natural supply such as wind, water, biomass and direct sunlight.

retrofit—The addition of energy and conservation systems, such as active solar or insulation, onto an existing building.

R-value—The resistance of a material, such as insulation, to heat flow. The higher the R-value, the better the protection against heat loss or gain. R-values are additive—double the insulation and you double its R-value.

solar energy—Free radiant energy from the sun which, when harnessed, can help to conserve our non-renewable resources and possibly replace some of them in the future.
–active solar—A system for solar heating in which collectors absorb the sun's heat, and mechanical pumps transfer the heat to a storage system and circulate it to supply buildings with hot water and space heating.
–passive solar—System for solar heating/cooling which requires no mechanical devices because the structure itself serves as a collector and storage me-

dium. It relies on such design features as proper building and room orientation, large south-facing windows, insulating shutters and overhangs for summer shading to maximize solar gain in winter and minimize it in summer. Passive solar is best suited for new construction and space heating and cooling.

tax credit—An amount you are allowed by law to deduct from taxes owed to the government. Tax credits are better than tax deductions because they reduce *taxes* rather than taxable income. For example, if you owe $1000 in federal income taxes and you are entitled to the maximum $300 conservation tax credit, you pay only $700 in taxes.

thermostat—A device that automatically activates equipment such as furnaces, air conditioners, etc. in response to changes in temperature.

valance—Short ornamental drapery hung across the top of a window.

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vapor barrier—A waterproof liner, such as plastic film or aluminum foil, or waterproof paint, used to block the passage of moisture through walls and ceilings. Blankets and batts of insulation usually come with a paper or aluminum foil vapor barrier already attached; with loose-fill insulation a separate vapor barrier must be added. The vapor barrier should always face the heated side of the house.

weatherize—To protect against the weather and make more energy-efficient with caulking, weatherstripping and insulation.

weatherstripping—Strips of material installed around the edges of doors and windows to stop air infiltration.

weep hole—Small opening to allow drainage of moisture from an enclosed space, such as a storm window.

NOTES:

All Through the House: A Guide to Home Weatherization. Thomas Blandy and Denis Lamoureux. McGraw-Hill, New York, 1980.

"Energy Cost Cutter," *Consumer Guide.* Vol. 169, January 1968.

The Home Energy Saver. Editors of Consumer Guide. Fawcett Books, New York, 1979.

How to Cut Heating and Cooling Costs. Peter Jones. Butterick Publishing, New York, 1979.

How to Save Energy and Money in Your Home. New York State Energy Office, Albany, NY, 1978.

The Illustrated Encyclopedia of Carpentry and Woodworking Tools, Terms and Materials. Stanley Schuler. Random House, New York 1973.

In the Bank . . . Or Up the Chimney? Second edition. U.S. Department of Housing and Urban Development, Washington, DC, 1977.

Money-Saving Guide to Energy in the Home. Consumers Union, Mount Vernon, NY, 1978.

Movable Insulation. William Langdon. Rodale Press, Emmaus, PA, 1980.

No-Cost and Low-Cost Ways to Save Home Energy. Memphremagog Group. Vermont Action on Energy, Essex Junction, VT, 1979.

No Heat, No Rent: An Urban Solar and Energy Conservation Manual. The Energy Task Force, New York, 1977.

Save Energy: Save Money! Eugene and Sandra Eccli. Community Services Administration, Washington, DC, 1977.

Saving Energy Is Saving Money. Texas Governor's Office of Energy Resources.

Thermal Shutters and Shades. William Shurcliff. Brick House Publishers, Andover, MA, 1980.

Window Design Strategies to Conserve Energy. Hastings and Crenshaw. National Bureau of Standards Building Science Series 104, 1977.

Calculating your energy savings.

The savings resulting from various energy conservation procedures depend on where you live, how large your house is, what type of fuel you use and the price of fuel. Average savings in a typical three-bedroom house, with 1500 square feet of living space, electrically heated, with electricity at 5¢ per kWh are shown on the Table below. Average savings for a one-bedroom apartment, 500 square feet, are shown on the second Table.

First look at the map and find the region you live in. Then read from the appropriate Table the typical savings for the conservation measures your residence needs.

To find out approximately how much you can save for your size residence, your fuel type and your fuel price, use the Energy Savings Calculator on the opposite page.

Dollar savings from energy conservation measures for a typical 1500 sq. ft. house, by heating region

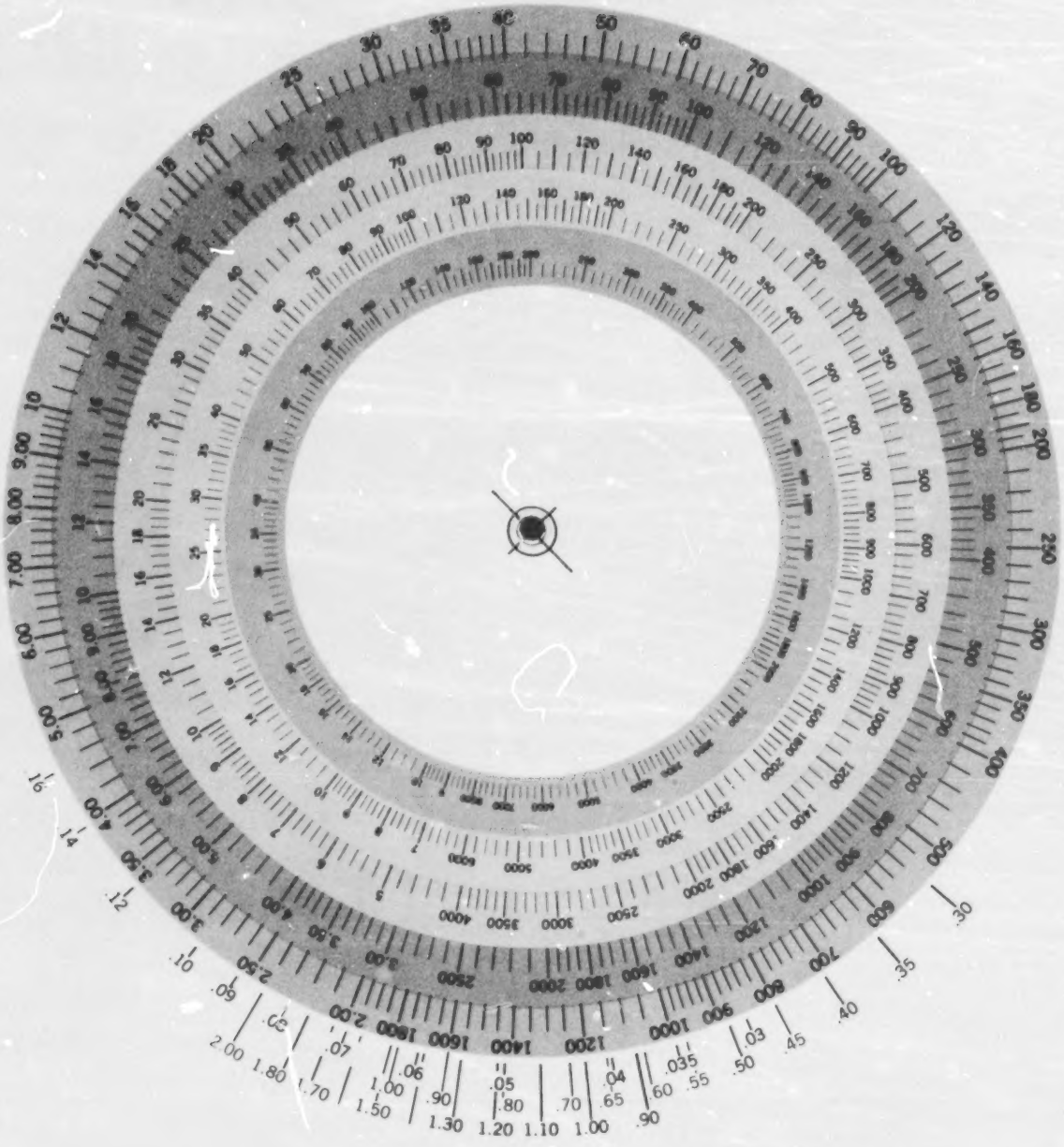
Region	I		II		III		IV		V	
Procedure	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling
Caulking	$30	$60	$45	$40	$70	$24	$100	$12	$135	—
Weatherstripping	25	50	35	30	55	20	80	10	110	—
Storm windows and doors	70	20	100	12	155	8	230	4	300	—
Insulating windows	50	—	80	—	120	—	180	—	230	—
Sun shading	—	150	—	90	—	60	—	30	—	—
Insulating attics	160	80	240	48	375	32	550	16	730	—
Insulating crawl space	40	—	60	—	95	—	140	—	180	—
Insulating basement walls	80	—	120	—	190	—	280	—	370	—
Insulating floor over unheated space	55	—	80	—	130	—	190	—	250	—
Thermostat setback (Winter) 8° at night	50	—	70	—	112	—	160	—	220	—
Thermostat setup (Summer) 3°	—	150	—	90	—	65	—	50	—	—
Insulating water heaters	12	—	12	—	12	—	12	—	12	—
Insulating heating and cooling ducts and pipes	25	15	30	10	35	5	40	2	45	—

Dollar savings from energy conservation measures for a typical 500 sq. ft. apartment, by heating region

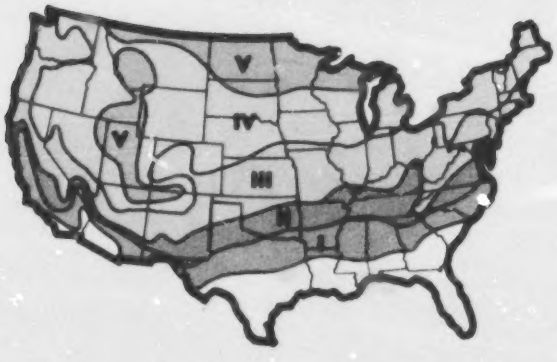
Region	I		II		III		IV		V	
Procedure	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling
Caulking	$10	$20	$15	$13	$20	$8	$30	$4	$40	—
Weatherstripping	8	17	10	10	18	7	25	3	35	—
Storm windows	20	7	30	4	50	3	70	—	90	—
Insulating windows	15	—	25	—	40	—	60	—	75	—
Sun shading	—	50	—	30	—	20	—	10	—	—
Thermostat setback	10	—	15	—	25	—	40	—	55	—
Thermostat setup	—	50	—	30	—	22	—	17	—	—

Percent savings on your cooling bill from a variety of conservation measures, by cooling region

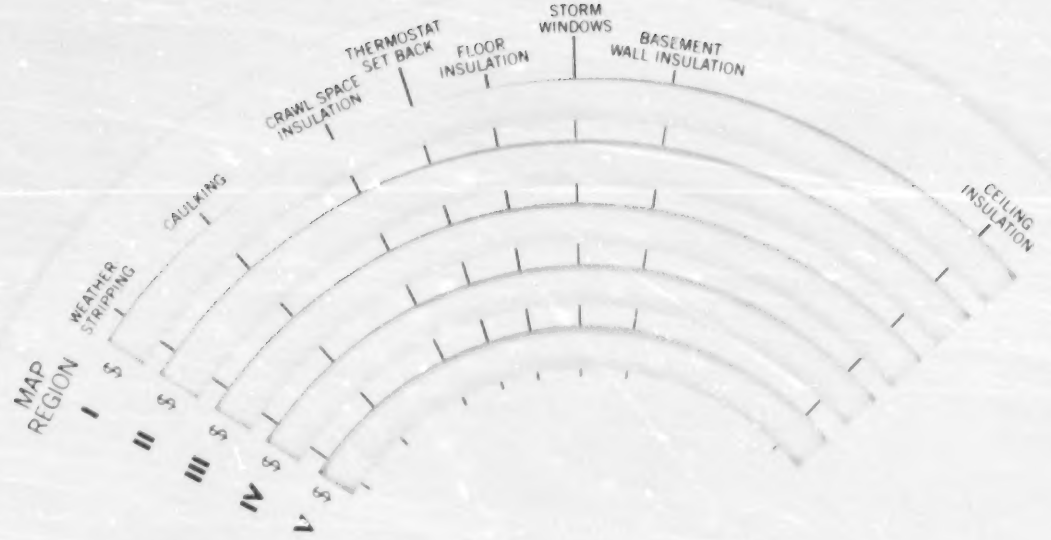
Procedure / Region	I	II	III	IV	V
Thermostat setup from 72°-78°	40%	25%	21%	17%	15%
Caulking	12%	10%	8%	7%	6%
Sun shading (outside)	18%	17%	16%	15%	15%
Insulating ceiling	4%	5%	6%	7%	8%



Heating Regions



Cooling Regions



Energy Savings Calculator

Step 1 Align the size of your house with the price of your heating fuel below.
Step 2 Based on the Heating Regions map, read the yearly savings for your region for various conservation measures above.

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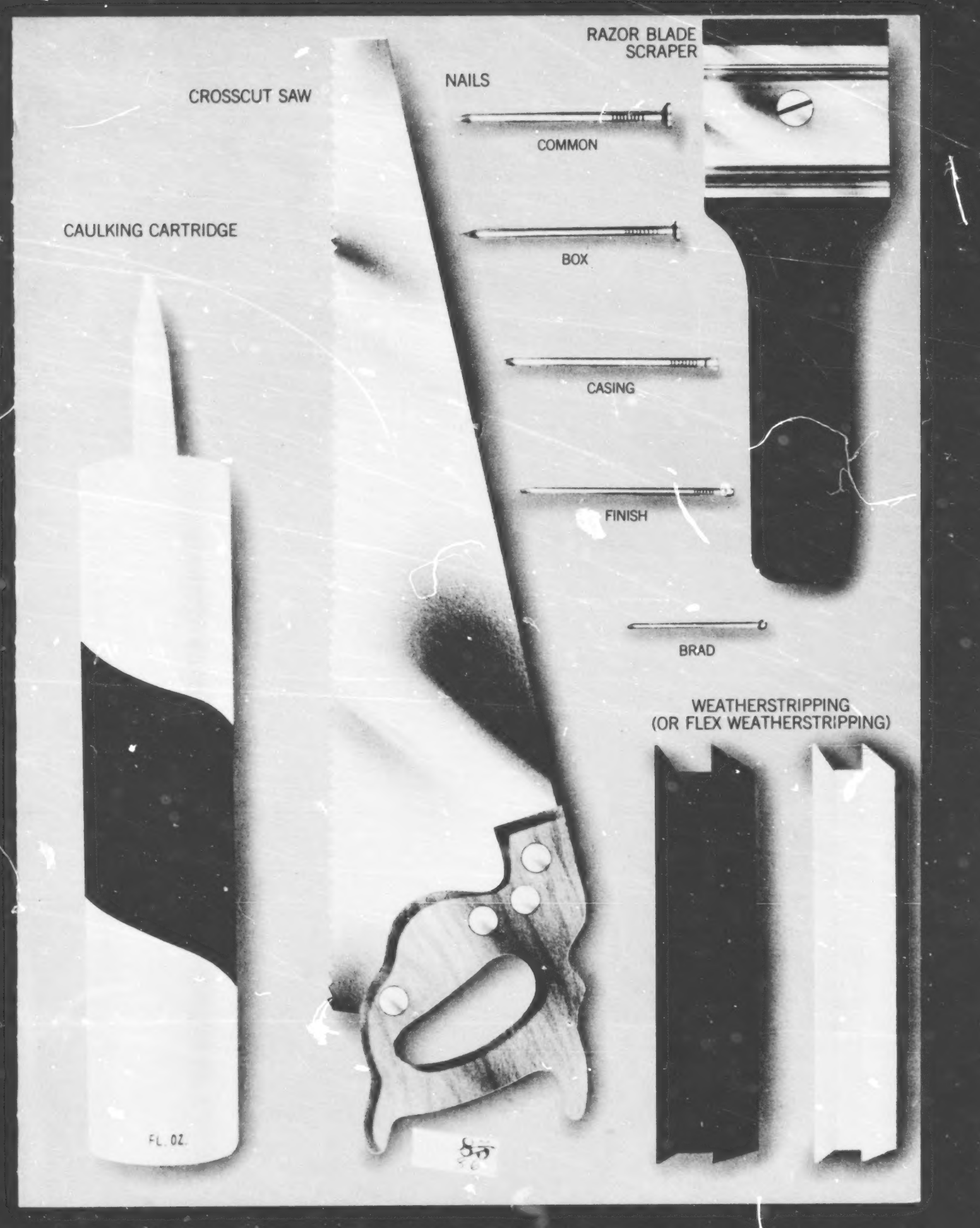
ELECTRICITY PER KWH
GAS PER THERM
OIL PER GALLON

$ 400 500 600 700 800 900 1000 1200 1400 1600 1800 2000 2500 3000

SIZE OF RESIDENCE IN SQUARE FEET
(LENGTH x WIDTH)


RAZOR BLADE SCRAPER
NAILS
CROSSCUT SAW
COMMON
CAULKING CARTRIDGE
BOX
CASING
FINISH
BRAD
WEATHERSTRIPPING
(OR FLEX WEATHERSTRIPPING)
FL. OZ.